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February, 1982

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ELECTRONICS

"THE BIGGEST NAME IN LITTLE COMPUTERS"

Available through Tandy Computer Centres, Computer Departments, and participating Tandy Dealers. *Monitor (not included)

inside your computer

Vol 1, No 8. February 1982

news

6

Your Computer News

Our round up of the latest in software and hardware, new and upcoming releases and happenings in the world of microcomputers.

76

More Computer News

Just to make sure you're up to date on everything.

Features

21

Brilliant Bee

The first release of the Applied Technology Bee. Les Bell gives the run-down on the system and talks to its creator, Owen Hill.

28

Write for Your Computer

We're always looking for the talented computer writer who needs a break into the glossy world of magazines. Les Bell tells you how to put together an article for the magazine, and make some money.

39

Osborne's 'Esky'

It looks like an esky and its operation is pretty cool, too. Adam Osborne's portable personal computer is reviewed by Your Computer's staff and US correspondents.

47

According to Haymes

We talk to John Haymes, computer buff extraordinaire, about his innovations.

reviews

36

Elf Micro Stats

How to use the microcomputer to win some money on the horses, lotto or any other numbers game. It may not work every time — remember, there's still the human element — but you'll have fun trying.

42

Microcomputing's Model T?

Tandy's TRS-80 Model I is a tried and trusty machine and Les Bell gives all those interested an insider's view of the system.

63

Sharp PC 1500

When they said computers were getting smaller they really meant it. The Sharp 1500 is a baby computer with amazing capabilities — it can even print in four colours.

for beginners

52

Basic for Birdwatchers

This month our step-by-step tutorial develops a quite comprehensive mailing list program — definitely a useful way to learn all about BASIC.

64

Understanding Assembler

Part one of a new tutorial Les Bell has devised to stimulate students of the microcomputer. In this article Les looks at the basics of assembly language.

83

Your Computer Clinic

Problem solving is (sometimes) our business...

education

33

Apple Isle Education

Tasmania has led the field in this

country in innovative computer education. Three teachers review the systems established in the '70s and discuss the new and interesting things happening in their State.

59

Education Software

Dr John Barrett, our resident computer education writer, looks at the requirements for good education software.

department

26

Linton-Simpkins

Frank Linton-Simpkins is a computer buff and he admits it. His regular column often looks at the more humorous side of computers, but he is also very informative.

70

Heard On The Bus

Leon Yendor is off to a good start for '82 already with one thought-provoking article to his credit. This is the second.

84

Text File

Your words, our pages...

72-92

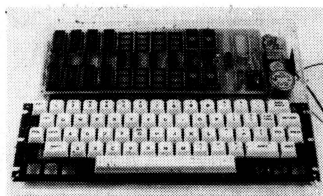
Popular Systems

Individual columns devoted to the popular systems: ZX80, CP/M, TRS-80, OSI, PET, Sorcerer, Apple. If your machine's not included, it probably will be soon.

94

Glossary

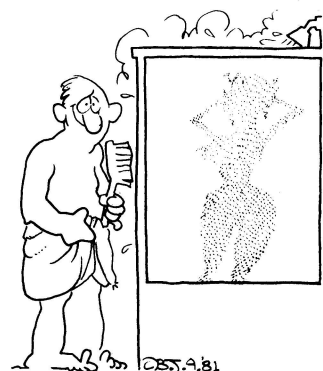
A guide to the latest foreign language — computer jargon.



Applied Technology's Micro-Bee is launched nationally in this magazine. We have the story, on page 21 and if you want to get right into the machine check out the owners manual for it — a special 32-page centre liftout.



What will they think of next... Sharp's latest pocket computer is a whizz that even prints and plots in four colours. See page 63.



This, according to artist Brendan Akhurst, is a Your Computer sub-editor about to clean up a Lulu — one of the things we describe when we tell you how to write stories for the magazine. It's on page 28.

editorial



THE CATCHPHRASE *On the lips of most computer company salesmen today seems to be CP/M. This magical incantation is held by salesman and customer alike to ward off the evil spirits of the software drought which has struck so many wayward travellers in the computer jungle.*

It's true that there's a lot of software available which runs under CP/M, and this software is freely available and often of high quality. But beware! The phrase CP/M-compatible only extends to software compatibility. It says nothing about the physical compatibility of the media on which the software is supplied with the purchaser's computer.

This problem has become particularly severe with the growing popularity of 13cm disk drives on commercial computer systems. Now mini-Winchester hard disks are freely available, manufacturers are dropping the 20cm drives for which IBM had forged a de-facto standard.

The result is, a number of commercial computers use 13cm drives with 'non-standard' formats and cannot read CP/M disks.

Some manufacturers (such as Datapoint, Xerox and DEC) have arranged with Lifeboat Associates to produce programs in the correct format for their systems. But many have not; and this is a point to check when you buy your computer, particularly if you intend to buy software from a supplier other than the hardware supplier.

To end on a positive note, it is possible to transfer software between machines, using a program such as BSTAM or Microsoft's UPLOAD/DOWNLOAD combination for the Apple SoftCard. So find yourself a friend with CP/M and 20cm single-sided, single-density drives and you can get around the problem.

— Les Bell

Editor: Les Bell

Managing Editor: Tony Blackie

Assistant Editor: Don Cox

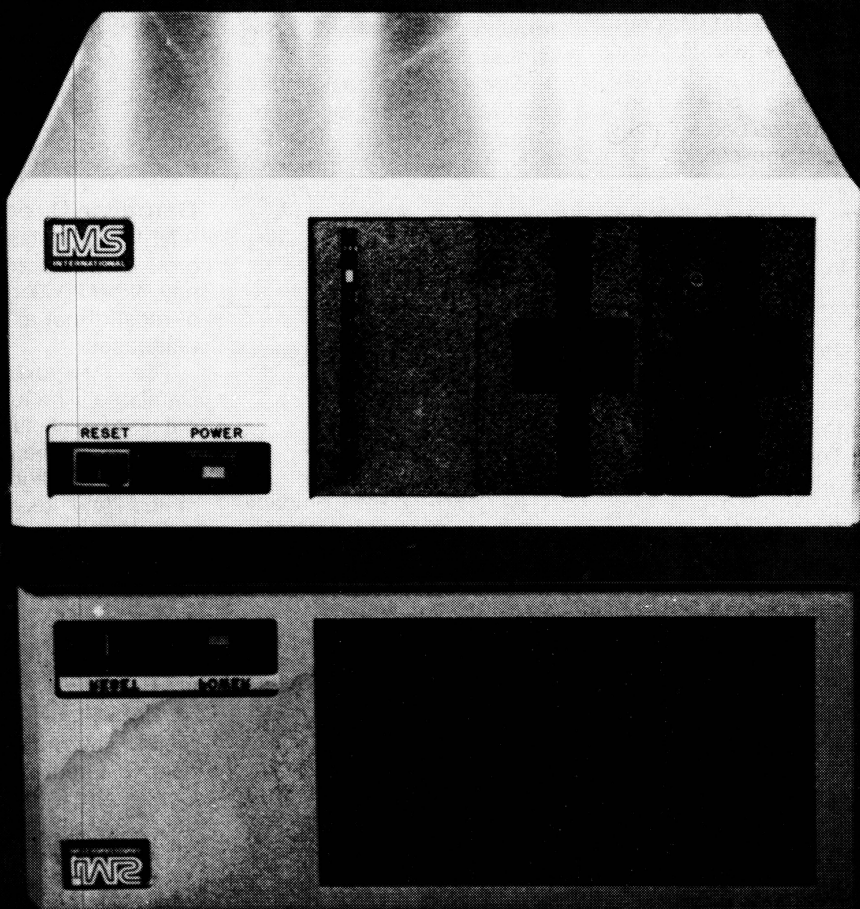
Art Director: Barry Brady

Advertising Manager: David McDowell

CONTRIBUTORS: **Australia** — Brendan Akhurst, John Batty, Bill Bolton, Paul Beaver, Chris Carolan, Geoff Cohen, Mike Holloway, John Mellor, Bref Ruhl, Peter Sandys, Greg Stringer, Keith Stewart, Fred Symes, Leon Yendor. **New Zealand** — Peter Isaac. **United States** — Roger Franklin, Daniel Montague, Christopher Reed. US news items via The Source, from Hamsource public files created by Dwight Ernest (TCU366, New York) and W5YI, Fred Maia.

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Announcing The Table Top Computer That Can't Be Topped.



The 5000 SX with:

Capacity: 5.5 MB Winchester Plus Two Mini Floppies

If you know our Series 5000 table top computer line, you know that *good* things come in small packages.

Now, with the introduction of the 5000 SX, *big* things come in small packages.

One integrated package can contain two double sided, double track density floppies plus a 5.5 megabyte Winchester drive.

Speed: Load 20K in Less Than a Second

Not only does our high performance Winchester subsystem include error detection with automatic error correction, its extreme speed is comparable to that of large main frame hard disk systems.

A 20K program loads in less than one second, about 10 to 12 times as fast as a floppy.

We invite comparison with our competitors' Winchester implementation then you will see how a truly engineered solution speeds up your application programs.

Extras: You'll Be Glad You Have Them

The 5000 SX comes standard with lots of extras, starting with a fully terminated S100 mother board. Add to that 64K dynamic RAM modules, with parity, of course, and receptacles for your CRT and Printer that turn on with the main power switch.

Plus, convenient up front power reset switch, incoming power line filter and much more.

Software:

Operating Systems: CP/M, MP/M, TurboDOS

Languages: BASIC, FORTRAN, COBOL

Application Packages: FMS-80, WORDSTAR, Accounting Plus, all tailored to operate on the 5000 SX.

Quality: So Good, It's Warranted 2 Years

There isn't room on this page to even scratch the surface of the IMS International story.

However, our 2-year warranty is a dead giveaway that we produce rugged, top quality, professional equipment. We do things right the first time so they don't come back to us.

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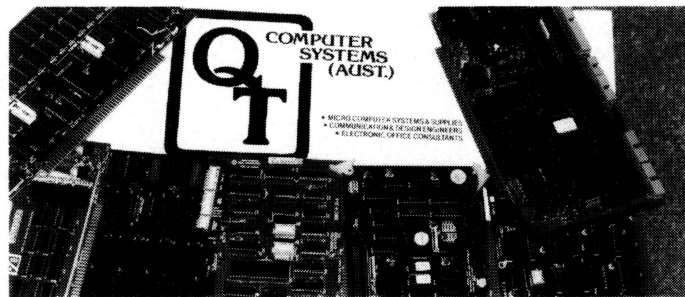
your computer news

InfoSoft Agency

INFOSOFT Systems, systems software house of Connecticut, USA has announced that AED Microcomputer Products is the exclusive agent for its products in Australia, New Guinea and New Zealand. The emphasis will be on InfoSoft's family of operating systems.

InfoSoft's fully CP/M compatible family of operating systems includes: Multi/NET (networking facility), Multi/OS (multi-user operating system), UNI/OS (single-user operating system) and I/OS operating system.

InfoSoft's other software products are WpDaisy (word processor), Daisy (screen editor) MailMerge (for mail lists), I/TERM (communications package), I/SAL (structured assembler), SAL tools (program development tools), NorthStar BASIC Interface and InfoSoft's 'C' Compiler. □



Local Products

USING an innovative combination of proven design and manufacturing technologies, QT computer Systems (Aust) has developed what it says is a range of high quality microcomputer systems at highly competitive prices.

The systems are designed for both businessmen and engineers. They can be used for accounting and word processing, as well as a variety of scientific applications.

Among other functions, the systems can be used for accounts payable, accounts receivable, general ledger, or-

der entry and inventory, payroll, real estate, medical practice and legal office accounting.

Application software can be modified to suit individual business or industrial users. As user requirements change, the systems can be re-configured for multi-user operation and hard disk storage.

The units are assembled and tested at the local commissioning centre. The QT office is staffed by graduate engineers who are available on call to assist with any application or technical enquiries. □

type modelling analysis together with the generation of such things as comprehensive manufacturing production schedules.

Technically, Panaplan, utilises VDU screen-based tables comprising rows and columns into which user data is entered, via a keyboard, against pre-defined headings and descriptions. Fast and accurate entry data is aided by the use of inbuilt screen prompts and a comprehensive range of input commands.

Once any such table has been created, Panaplan's editing facilities enable data within any row or column to be changed, added to or deleted. Rows and columns themselves may also be added or deleted. □

Database Directory

A NEW publication from Infogrow, of 49 Clarence St, Sydney, NSW 2000, gives details of most, if not all, Australian databases.

The Infogrow Australian Database Directory gives full details of each database, including its scope, record format, publications, access method and hosts.

The first section of the book gives general information on how to use the directory, as well as giving general information on the various database networks. The second section is the directory proper, listing such diverse information sources as the Australian Feeds Information Centre, the Community Welfare Database and the Australian Sheep and Wool Information Service.

To gain some idea of the directory's utility, try answering these questions: Which database contains references to major articles and reviews in the National Times? Where can you get

SSM's Enhanced Board

SSM Microcomputer products, a leading Californian manufacturer of board-level products for the IEEE 696/S-100 bus, has introduced a new video board for the popular computer system.

Designated the VB3A, the new board is an enhanced version of SSM's VB3 and incorporates all of its predecessor's features. The VB3A replaces the older product and offers additional operation features, as well as extended applicability to the wide variety of CRT/monitors.

Among the features of the new board is a smaller, six by seven upper and lower case character EPROM which retains descenders while opening up the screen for more text. Thus in one mode the VB3A allows users a display of 24 lines by 80 characters

on a standard P4-phosphor monitor.

A second mode adds a 25th line used for status updates. The EPROM also permits up to 50 lines by 80 characters to be displayed on a monitor having a P39 (long-persistence) screen.

Other significant features include the availability of positive or negative-going horizontal and vertical synch pulses, and TTL-level outputs.

A retrofit kit is also available for users to update existing VB3s to the capabilities of the VB3A.

SSM Microcomputer Products, founded in 1974, manufactures and markets a wide range of board-level products for the IEEE 696/S-100 bus and Apple II microcomputer. The company recently entered the software market with its Transend series of

data communications packages for the Apple II. □

Financial Modelling

THE COMPUTER Company (TCC) has announced the introduction of highly flexible financial modelling software designed to assist administration, accounting, marketing and engineering personnel in a wide variety of budgetary planning and forecasting functions.

Known as Panaplan, the software operates on TCC's Panasonic range of microcomputers. According to the company, it can be applied to virtually any application involving the manipulation of numerical data.

As such Panaplan can be used for the preparation of basic financial reports through to detailed 'what-if'

information on how people travel to work at local government area level? Which database holds information on alcohol from crops as an energy source?

The answers (obviously) are in the Infogrow Australian Database Directory, available from Infogrow for \$25.00. □

Unemployed Helped

TANDY Electronics, in conjunction with the Commonwealth Employment Service at Parramatta in Sydney's western suburbs, is offering free 'computer familiarisation' courses to 80 young people who are registered as unemployed with the CES.

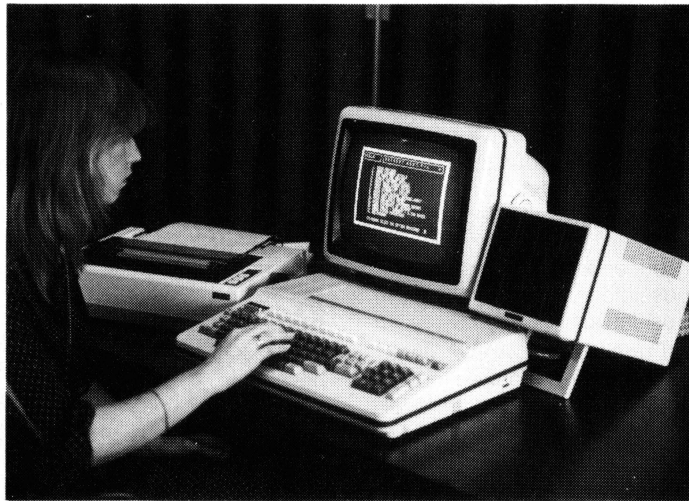
The courses, which normally cost \$39.95, are designed to give these young people an understanding of computers, an insight into computer programming and helpful advice on how they can enter the growing computer industry.

Held at the Tandy Computer Centre, 267 Victoria Rd, Rydalmere, each of the four courses consists of two three-hour sessions in a unique classroom of TRS-80 Model IIIs.

The courses will also feature the exclusive network controller system, which allows the educator to instruct the class as a group and/or switch to individual students for extra attention if required. The courses include the history and development of computers and components of the modern microcomputer. Students will then have the opportunity to write and develop their own programs.

Tandy hopes to expand the programme through the company's computer centres in key capital cities.

For further information contact Mr Darrel New of the Commonwealth Employment Service, on 635-5444. □



Sharp's personal computer, with 64K RAM twin disk drives and yet another Epson-by-another-name printer.



Sharp Enters Market

SHARP has entered the Australian microcomputer market with a modular system aimed primarily at the business and professional segments.

The PC3201 is the first Sharp computer offered here. It is a compact business system including an advanced keyboard with additional programmable definable keys, a large CRT display, rapid printer and double disk drive.

It features 64,000 characters of usable memory. This can be expanded to 112,000 if necessary.

"We have produced and vigorously tested our own software for Australian appli-

cations, and we launch the product in the knowledge that the PC3201 will be well supported from software to sales and service in every State," says software development manager Ian Parsons.

The unit with a standard package of software will retail at around \$7500. □

Retail Group

SEVEN retailers of mainly Commodore microcomputers have banded together under the banner of The Australian Microcomputer Distributors.

While the retailers will operate independently each will enjoy the benefits of bulk purchasing of stock. In this way

they hope to be able to compete with some of the backstreet discounters while maintaining top professional service to their customers.

The group is also importing a range of software packages not normally available — another benefit of bulk purchasing and multi-outlets.

Speaking at a function to launch the establishment of The Australian Microcomputer Distributors, Mr John Guidice, managing director of Sydney's Micro Computer House, said the new organisation should not be construed as a pressure group to gain special advantages from manufacturers and importers.

Simply, it meant by combining the purchasing power of a number of retailers, the group could expect to buy at lower prices, which would be passed on to the customer.

He added that though all seven members of the group were best known for their sale of Commodore equipment, they would now be looking to a wider brand range to sell.

In the matter of specially imported software Mr Guidice said some distributors, including Commodore, found it uneconomic to import a complete range. However, he added, that was not the case for a relatively small organisation such as TAMD.

The main market push of the retailers is the small business area so the software being imported is mostly business-oriented. Already available from the Supersoft stable are the Mikro Assembler, Arrow and high-resolution graphics board. Others include the Maton Shark, an intelligent Winchester disk subsystem, Wordcraft 80, the Cognivox voice I/O peripherals and Petdisk II.

Apart from the Micro Computer House, the members of

TAMD are: Pittwater Computer Sales, of Mona Vale, Sydney; Computers Ltd, Caringbah, Sydney; CW Electronics, Sunnybank, Brisbane; Computer World, Darwin; B.S. Microcomp, Melbourne; and Datasoft Business Machines, Perth.

At least three other retailers are negotiating to join the group. □

Quote Of The Month

FORMER FCC chairman Richard Wiley said in a speech before the National Symposium of Business, Government and the News Media in Austin, Texas: "We are witnessing today a new era — the information age."

"It will ultimately mean half the nation's Gross National Product will be directly or indirectly derived from the dissemination of information."

He called for an end to all government regulation over information transfer, except in extremely limited competitive or monopoly situations such as local telephone services. □

Mail Orders Stopped

IBM apparently has Apple Computer shivering in its britches.

Faced with a possibility (if not a probability) of a smaller piece of the microcomputer sales pie, Apple has made some recent behind the scenes distribution and pricing changes which it feels will tighten and improve its marketing position in the US.

Specifically, Apple has cut the price of the Apple III problem child and has required all its authorised dealers to sign agreements stating they will not engage in telephone or mail order marketing.

The Apple III price cut was neither unexpected nor revolutionary. Radio Shack, Zenith and Xerox, among others, have all become more com-

petitive as the micro sales action heats up.

But the sales agreement Apple dealers were forced to sign ("otherwise it will be assumed that you have chosen to terminate your authorized dealership and the termination will become effective December 4, 1981") smacks of a price-fixing scheme and a possible violation of US anti-trust laws.

Furthermore, Apple dealers are being required 'not to ship excess product to local discounters'.

It is clear that in the end the consumer will end up paying list price for Apple products — or at least much more than would normally be the case. Apple says its product requires direct in-person contact with the customer and points to this as its reason for the forced sales agreement.

Apple apparently doesn't want to end up with a distribution network like Tandy/Radio Shack has now. RS stores, both company-owned and franchisee-owned, complain bitterly that they are frequently called upon to demonstrate TRS-80 computers and peripherals, but the customer ends up buying from a mail-order house (a Tandy dealer) which can price the goods as it sees fit.

Savings, particularly if you buy out of state in the US, approach 20 percent.

Tandy successfully works both sides of the street. It sells through its computer centres and Radio Shack stores, and through an independent dealer network. Many of the RS dealers sell via a free telephone number and advertise huge discounts in computer mail-order journals.

Six West Coast Apple dealers have requested a temporary restraining order, seeking to block Apple's attempt to eliminate cut-rate sales of their products. They

say the new agreement is illegal.

The president of Olympic Sales of Los Angeles (which usually posts the lowest Ap-

ple prices in the nation) said other firms Olympic buys from "don't tell us how to sell their products, so why should Apple?" □



Michael Grosvero and Kevin Davidson of the Microcomputer Assessment Service.

Business Consulting

A CONSULTING service to provide small business with an independent assessment of computer requirements has been established in Victoria.

The company, Micro-Computer Assessment Services, will provide each client with an analysis clearly defining performance standards necessary to do the required tasks.

"With out assessment in his hand, the client can go shopping knowing that the only decision left to make is brand or colour," said Mr Michael Grosvero, director of MCAS.

"Before shopping for a computer, the businessman really needs to know his data storage and RAM memory requirements, processing speeds, and software needs. Too many systems have been sold by enthusiastic salesmen that have not matched the clients' needs, Mr Grosvero said.

This had not always been the salesman's fault, but was often caused by a lack of systems expertise in his company.

"Our service is designed to eliminate this lack, and provide the potential buyer with the information to shop in confidence," he added. □

GLOBAL SOFTWARE NETWORK

SORCERER SOFTWARE

UTILITIES:

SCREEN SYSTEM — A menu driven network of machine language routines that facilitate working with graphics. Animation is achieved by storing up to 50 files in memory and recalling them in a programmed sequence. Files may be saved on tape for later use. You can draw on the screen, store, recall and edit these files. Up to 50 steps can be entered to perform recall and refile functions automatically. Written in ASM and includes a demo file. \$25.95

CHARACTER GENERATOR — Makes designing graphics and shapes a snap. Graphic cell data may be stored on tape. \$10.95

GRAPHICS 1 — Resolution of 128x90. Each point individually controlled. Easily accessed from your programs. \$25.95

GRAPHICS 2 — Resolution of 512x240. May be accessed from other Basic's besides Exidy's Rom Pac Basic. \$25.95
Both Graphics packages include demonstration software.

SUPER DISASSEMBLER — A very fast Two pass disassembler with several versions on tape at different memory locations.

Sample printout (video and/or printer):

E993	F5	LE993	PUSH	AF
E994	CD 1B E0	CALL	LE01B	
E997	FE 0A	CP	00AH	
E999	29 14	JR	Z, LE9AF-\$	
E99B	F5	PUSH	AF	
E99C	DB FF	LE99C	IN	A, (0FFH)

Can be used with the Development Pac. \$21.95

EDUCATIONAL:

SORCERY BREWS — A book of greater than 100 pages in length stuffed full with information. Has chapters on the Monitor, Basic, Machine Language, Basic Rom Pac map, interfacing and routines, I/O drivers, CP/M, Word Processor and Development Pacs, creating sounds, video, keyboard, joysticks, plotting, programming tips

plus a lot more. Everyone is sure to discover something they will treasure! \$16.95

ARITHMETIC — The ultimate in elementary maths tutorial (CAI) programs. Routines for addition, subtraction, division, multiplication at 5 levels and times tables. On completion a full report is given. Very graphical making it attractive to the student. \$24.95

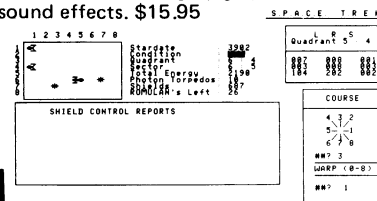
GAMES:

CRAZY DRIVE — An adventure game with graphics! If you like exploring strange towns by car, this is for you. You have a choice of 70,000 "Crazyvilles" to visit, each having a different street plan. Written in ASM. \$15.95

CUBE — A graphical Rubik (TM) puzzle. You can begin with the solved cube and jumble it up or you can select preprogrammed puzzles whose solutions the Sorcerer will show upon request. \$12.95

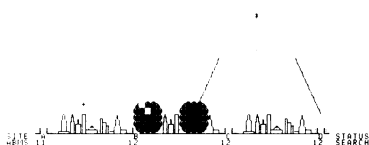
SPACE TREK — If you've been watching the T.V. series of late you'll know what

this is all about! Highly graphical and with sound effects. \$15.95



ARCADE GAMES:

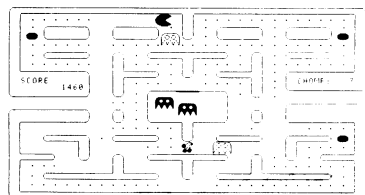
MISSILE DEFENSE — You command the country's defense centre to protect against foreign attacks. \$19.95



SORCERER ASTEROIDS — If you have ever played this game in the arcades you will be amazed at its similarity. \$21.95

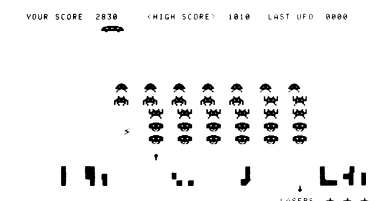


CHOMP — This is the ghost muncher!!! And higher resolution too! \$21.95

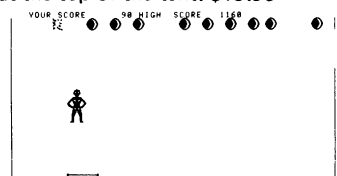


SORCERER INVADERS —

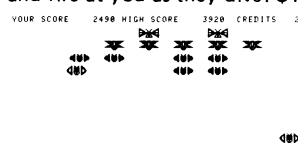
The superb graphics and fast-paced action make this program very addictive. \$15.95



CIRCUS — Try to keep the clowns on the trampoline and bursting the balloons at the top of the tent. \$19.95



SORCERER GALAXIANS — Watch those spaceships peel out at the top of the screen and fire at you as they dive! \$19.95



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Optics Test

A UNIQUE experiment in state of the art communications technology has been inaugurated in the farming communities of Elie and St Eustache, Manitoba, fifty kilometres west of Winnipeg in Canada.

Residents are taking part in the world's first project to test fibre optics technology's ability to deliver a full range of communications services in a rural environment.

The \$C9.6 million field trial brings single party digital telephone, cable TV, stereo FM radio and Telidon services to one hundred and fifty households by means of hair-thin strands of glass called optical fibres.

A rural setting was chosen

for this project because telecommunications specialists believe fibre optics may provide answers to one of Canada's most difficult communications challenges: how to span vast distances to provide first-class telecommunications in sparsely populated rural Canada. ☐

Erotic Software Quarterly

IT HAD to happen sooner or later, and from what better place than 'Sin City', New Orleans.

No matter what you're into, eventually someone will figure a way to link sex, the universe's universal preoccupation, with it. And personal computing is no different.

The Dirty Book is totally devoted to "the enjoyment of life... sensual sexuality rather than perversion... preforeplay", according to its premiere December 1981 issue. Much of that first issue is handled in a humorous way.

The publisher — Bourbon Street Press of 3225 Danny Pk, New Orleans Metairie, LA 70002 — sends it in a plain brown wrapper.

Actually a pocket-sized magazine, The Dirty Book concentrates on erotic software for the Apple, TRS-80, Atari and Commodore personal computers. It even sponsors a quarterly contest "aimed at stimulating sensual software development", with a box of 100 diskettes as first prize.

The current contest has Erogenous Zone Numbers as its theme, with a February 15 deadline. You're not necessarily required to stick to the required theme, however. The publisher says he's particularly interested in "programs that feel, smell or even taste good".

The first erotic software development winner was Tom Mannos from Southern California (where else!). He wrote a game called Wahtzee... a sort of computerised Yahtzee with sound and superb graphics. Wahtzee is a family game, but if you know how to access the 'hidden' games which lay below a 'four-tier security blanket' (blanket, get it?) you can also play Pochtzee, a gambling

MICROCOMP TAKES OFF

MICROCOMP began in October, 1979, with just Nicki and Bill and the Commodore Product. In April, 1980, we moved into the City and the following October, John Phillips joined the team as a Programmer. Errol the Cat moved in during July, 1981. Now into our 3rd year, Andy Johnston has joined as our Systems Engineer and Robert Mitchell as a Trainee Programmer. Because of extra staff and more products to display, MICROCOMP has taken extra space on the 3rd Floor of 561 Bourke Street, This area is for an additional Showroom handling the new VIC 20, the hobbyist, educational and personal Microcomputer market, leaving the 4th Floor Showroom for the Business orientated Microcomputer market.

All this has been due to the loyalty of our existing customers and their continued business. The success of the Commodore Range, their reliability and good value, have made MICROCOMP the leading Commodore dealer in Melbourne.

Our new showroom officially opens on Tuesday, 2nd February, and we are having an OPENING SALE to celebrate. So please come and see our Microcomputer range, our vast selection of Microcomputer books and our various Microcomputer related products, such as High-Resolution Graphics, Programmers Toolkits, RS232 Test/Patch Sets, KC NET-KITS, Softbox CPM Adaptor, Corvus Hard Disks, Epson MX80 and MX100 Printers, the American Source Data Base and more.

We pride ourselves on our friendly and efficient service. Our expansion does not mean less individual attention to our customers. We can now offer more services and keep up with our ever increasing workload.

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YC 8

game with interesting payoffs, Fuhnzee, a party game, and Erotzee, an XXXC (the C is for Class) interpersonal strip game with explicit graphics. Winner Tom says he's now working on an 'educational orgy program'.

Featured in The Dirty Book are erotic software reviews. We didn't know so much was available! Interlude, the well-known sex software which reached notoriety when the Wall Street Journal featured it in a recent article, isn't unique as was thought.

Some samples: Pornopoly, Bawdy Adventure, seXRATED, Encounter, Whorehouse, Softporn Adventure, Dream Machine, Sex Disk, Voyeur I, Digitized Nude

Graphics (from popular men's magazines), Street Life, Scoring!, Hi-Tech Sex, Personal Sex Test, Compu-Grope, Zesty Zodiacs, Wanna Play Footsie, Conquest Test, and much, much more. There's even animated sex cartoons for the Apple II, such as Dirty Old Man and French Postcards.

The publications includes some cartoons, but they're all computerised graphics.

The mag isn't cheap, however: \$US29.95 for a four-issue annual subscription. □

Employees' Computers

HONEYWELL says its Minneapolis Credit Union is issuing between 10 and 15 interest-free loans a week for

the purchase of personal computers.

The loans are part of a year-long programme implemented at the request of MOTEC (Minneapolis Operations Technical Council), to encourage employees to feel comfortable with computers.

"The introduction of computers has been equated to the Industrial Revolution, and we think Honeywell can only benefit by having a work force familiar with them," says Jim Daughton, chairman of MOTEC's subcommittee on computers for productivity.

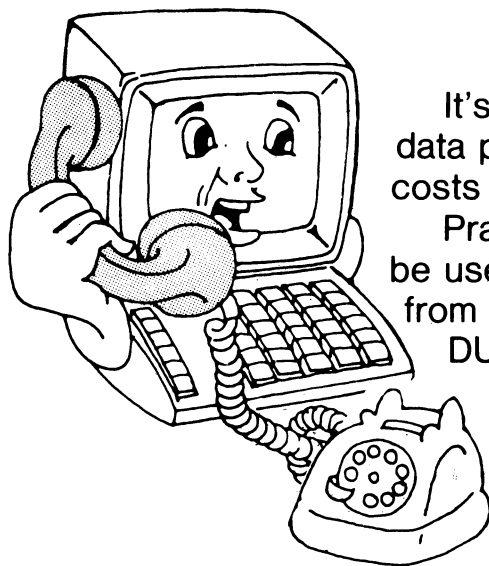
"Having a computer at home will let employees become familiar with computers without the pressure of a

classroom or work environment," Daughton said.

The incentive to purchase computers is increased by discounts arranged by the Honeywell Computer club. Selected Apple dealers are offering up to 32 percent off certain items and Radio Shack has reduced some of its prices by 18 percent. Discounts are also available for Atari, Commodore, Texas Instruments, Xerox, Hewlett Packard and Heathkit. □

VIC Centre

TO COINCIDE with the release of Commodore's low priced home computer, Computerware has announced the establishment of The VIC Centre. Telephone: (03) 602 1006. □

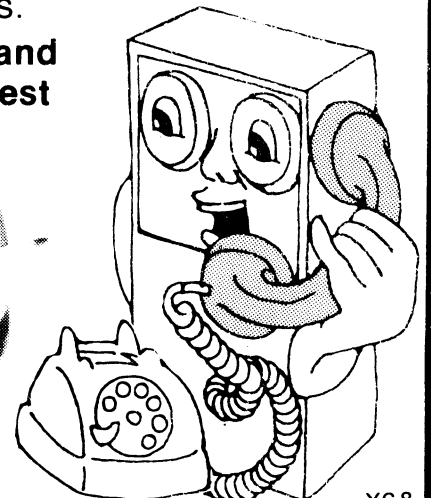
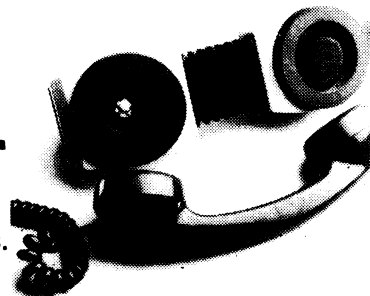


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Colour Printer

THE CASE CX-80 sets new standard in price performance for colour printers, according to Case. Priced at under \$2000, the CX-80 is the first product to provide colour character and graphics printing at a price which most colour computer and terminal users can justifiably afford.

The CX-80 is suitable for a whole host of applications including business graphics, image analysis, process control, financial analysis and computer aided design. Interfaces are available for microcomputers, minis and colour terminals.

Case's sales manager David Hoad says, "most colour computers and terminals supplied to date have been installed with normal black ink printers. This is because there has not been a colour printer available at a price the user could afford. They have had to content themselves with producing single colour print-outs of multi-colour displays with the inherent loss of information and impact in the process.

"Now with the CX-80, users can have a complete colour system for very little more than they would pay for a system incorporating a single colour printer."

The CX-80 prints in seven colours and is capable of operation in both character and dot addressable graphic modes. It operates at 125 characters per second with a line length of 80 characters. It prints the full 96 ASCII upper and lower case character set together with 64 graphic characters and 15 user programmable characters, plus double width and reverse characters.

Printing is on a seven by five matrix for ASCII characters and seven by six matrix for graphic characters. In dot addressable mode, re-

solution is 60 dots per inch in both horizontal and vertical planes.

The CX-80 operates with a striped ribbon; the printer decides which stripes are required to produce the required colour. Special paper is not required on the CX-80.

The CX-80 is available with Centronics compatible parallel, IEEE and RS232 interfaces, enabling it to be interfaced to virtually all types of computers and terminals. A special Apple II interface card enables the Apple screen display to be dumped directly to the CX-80. □

Archives Distributor

THE RANGE of Archives computers and ancillary products is now being distributed by the newly formed Archives Computers (Aust).

The new company is headed up by Mr Gower Smith, who brought Archives to Australia for the previous distributor, CGF Electronics.

The new company and its 10-man support team have moved into new offices in South Melbourne. The company will handle both wholesale and retail sales in Victoria, and sell through a chain of 22 retailers and OEMers to provide national representation. □

Auditing System

INTERNATIONAL accounting firm Arthur Young has achieved a breakthrough in computer auditing with the introduction of the first microprocessor based, stand-alone, AuditComputer.

Designed to perform client audit and accounting functions, the AuditComputer can accept and process data transmitted from virtually any type of data processing system, thus eliminating the need to adapt audit software to various types of mainframe and minicomputers.

The AuditComputer con-

sists of three major modules, including an Apple III microcomputer, a Corvus Systems mass storage unit capable of storing up to 18.6 million characters, and a Dynabyte or Altos Computer Systems remote data capture unit.

Data can be transmitted to the AuditComputer over standard telephone lines, by means of magnetic tape or IBM 3740 floppy disks.

The system was released by Arthur Young in Canada and the USA in August 1981. It is currently undergoing field testing at ten Arthur Young offices in North America for a period of six months. Arthur Young expects to have the AuditComputer in its principal Australian offices in the third quarter of 1982. It will sell to branches for around \$20,000.

According to Rick Richardson, a visiting computer audit partner of Arthur Young in the United States, the advent of the microcomputer has made possible the economic development of this independent audit system and hence enable a move away from the complicated use of various software packages to a single audit hardware unit. □

Productivity Issues

HIGH technology has invaded the office, computers and word processors are everywhere, but has there been an increase in productivity?

The productivity of managers and professionals will be the main theme of Sydney and Melbourne seminars conducted by the International Information/Word Processing Association, on February 23-25. The association has invited two renowned leaders in the field of information processing to be keynote speakers.

John J. Connell is executive director of the Office Technology Research Group

(OTRG), an association of senior executives in information management and associated fields. The group operates throughout the United States, Canada and the UK, and its members represent some of the leading and most progressive organizations using integrated office technologies.

OTRG functions as an information network and as a basis for management studies into the best use of modern office technologies.

John Connell will discuss means by which we can improve the productivity of managers and professionals, and also how to measure it. He will bring practical experience from both his own 25 years in the business and from the many studies and surveys conducted by OTRG.

Linda O'Keeffe is 1981-82 international president of the II/WPA, an honour which recognises her prominence and contributions in the field of information processing. She is also assistant vice president in charge of advanced office systems at Valley National Bank, Phoenix, which has one of the largest information processing installations in Arizona.

She will address the crucial issues facing management which arise from the rapid changes in office automation technology, and will also discuss systems integration by the Project Team Method.

In Sydney, an additional seminar, Office Automation for Small Business, will help managers of small businesses to negotiate the treacherous maze of selecting, installing and operating a computer for accounting and word processing applications. Attendees at the Sydney seminars may also take the opportunity of visiting the Business Efficiency Fair, which will be located five

minutes from the seminar venue.

For the dates of the seminars, contact the appointed organizers, The Qube Management Group (02) 233 1027, 233 7350, or Wordpro (03) 699 8555. □

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opment of this independent audit system, and hence enabled a move away from the complicated use of various software packages to a single audit hardware unit. □

Single Board Computer

SYDNEY firm Table Top Systems has released the AC-85 single board computer. Designed as the heart of a small business micro system, the AC-85 provides the expert hobbyist and the forward looking end-user with a low priced entry into computers.

On a single 22cm by 30cm board, the user will have available: a fast (10MHz) 8085 A-Z CPU, 64 Kbytes of Dynamic RAM, 2 Kbytes EPROM Bootstrap Monitor which after start up is replaced by RAM, three RS-232C serial channels with software selectable baud rates, double or single density 20cm floppy disk controller with DMA, a real time clock, and a complete CP/M configured ready to run.

The AC-85 has been designed to allow users to take advantage of the large amount of software that has been written for the CP/M operating system. All that is needed to turn the AC-85 into a complete and powerful system is: a power supply for the AC-85, disk drive and power supply and RS232 terminal and printer.

The AC-85 with terminal and power cables, comprehensive manual with schematics and CP/M version 2.2 (specify whether single or double sided diskette drives) costs \$1495 plus sales tax.

Table Top Systems also has an alternative and lower priced source of CP/M software.

Its recent appointment as dealer for the US East Coast software distributor Westico has made available in Australia the services of 'The Software Express'.

Many of the old standbys are available, like CBASIC version 2, the Microsoft BASICS, FORTRAN and COBOL, PLI-80, three versions of Pascal as well as many specialist application programs.

These include Business Master (the CBASIC integrated general ledger, debtors, credits, inventory, order entry package that is available in Source Code), Job Cost, PAS-3 Pental and PAS-3 Medical Packages, and PTA — Professional Time Accounting for lawyers, accountants, and engineers.

Of particular interest are two specialist programmes, Lynx, a friendly overlay linking loader that can create compiled programmes that will run in smaller sized systems, and Reformatter, a pair of programs which allow the user to read and write to either IBM format or DEC RT-11 format floppy disks. □

Toshiba Computer

TOSHIBA Australia has entered the small business computer field with the T-200, a machine which even has Toshiba-manufactured microprocessors.

Toshiba Australia says firms which have waited to convert from manual systems will appreciate the advance in disk storage, memory capacities and price performance afforded by the T-200.

Its arrival coincides with Toshiba's appointment of Mr Dick Simpson as general manager of the company's Electronics Office Equipment Division.

The T-200 incorporates two 13cm disk units to provide 560K bytes of storage capacity. The disks are the latest double-sided, double-density type.

In memory, the T-200 exploits the advance afforded by Toshiba's microprocessor,

with 64K bytes of memory capacity.

Toshiba's Business BASIC and/or CP/M system is the key to the T-200's versatility in business applications. With the availability of sequential, random and indexed sequential 13 cm disk files, tasks requiring data insertions and deletions are simplified.

Toshiba Australia plans to market its own basic software packages with the T-200 to support a broad spectrum of business and industrial needs. These include specialised programs. A number of programs have been written for CP/M, covering a range of applications. These programs are currently being converted for the T-200.

Announcing the launching plans, Dick Simpson said: "we shall market the T-200 from the outset throughout New South Wales, Victoria, Queensland, Tasmania and the ACT, and we expect to expand distribution very rapidly to South and Western Australia." □

Versatile Dragon

A MELBOURNE computer company's acceptance of a gauntlet thrown down by the Education Department has resulted in the development of what the company describes as "the world's most versatile microcomputer".

The company, Professional Australian Systems of Thornbury, launched its DYAD Dragon in September 1981, following two year's design and research work into the needs of schools.

"We believed we had made provision for every feature a school could need in a computer, and afford," said PAS managing director Mr Neil McKellar.

The basic unit incorporated an automatic hopper feed card reader and could

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8 ☐	DOS 3.3 *plus tax	65.00*
10 ☐	EPOCH	37.50
11 ☐	HIRES 3 (CRANSTON MANOR)	39.95
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be given input through cassette, keyboard or disk drives. It runs 6802 software and is Tandy and Apple compatible.

"The Technical Schools Division of the Education Department issued new tender specifications calling for CP/M operating system and a single 20cm disk configuration," Mr McKellar said.

Time was short, but as a result purchasers of the Dragon now have the choice of 6802 and/or Z80 chips in their CPU, 13cm or 20cm disk drives, or both, the choice of Flex and/or CP/M operating systems, and the inbuilt card reader.

The unit had already been designed for use with CRT or a television set, and to interface all industry standard printers.

"We are already making slight modifications to enable one client school to interface the Dragon with its American-made minicomputer," Mr McKellar said. "And if someone can think of something else to add, we'll cheerfully do it for them."

TRS-80 Service Plans

TANDY Electronics, the Australian branch of Tandy Corporation, has announced the introduction of a set of three new service plans. The plans are designed to meet the service requirements of owners of its best-selling microcomputer, the TRS-80.

Field Service offers complete on site service by a technician and features free installation if executed at the time of sale. Applicable on TRS-80 Model II and Model III disk systems, Field Service allows for up to six service calls per year on equipment under warranty and four service calls if warranty has expired.

The plan is available from any Tandy store, computer centre or participating dealer

for only ten percent of the recommended retail price of the TRS 80 product(s) to be covered, with a surcharge applicable outside a 25 km radius of service centres.

Express Maintenance is a prompt 'door to door' service plan specially designed for owners in remote areas. It features complete parts and labour warranty for a full 12 months, unlimited number of repairs, top priority free overnight shipment of TRS-80 equipment to a Tandy Service Centre and back again, and 24-hour workshop turnaround time.

Extended Service provides a comprehensive parts and labour warranty for a full 12 months. A unique 'carry in' service plan, Extended Service provides convenient, fast service on all TRS-80 products.

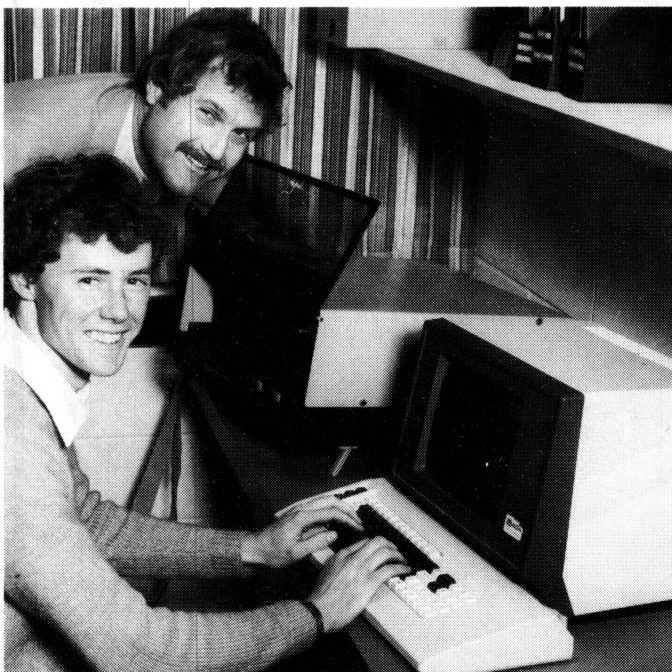
Under the plan, equipment requiring service need only be presented to any Tandy store, computer centre or participating dealer for prompt attention. Extended Service is available for only seven percent of the recommended retail price of TRS-80 product(s) to be covered, with a minimum premium of \$100.

Classroom Creation

AN enterprising teacher and two gifted senior students have used their classroom computer to create a valuable educational administrative package for their school.

The product, appropriately called Students, is currently being marketed generally and already the software has been sold and installed in a second independent school.

In 1979, Mr Vic Ryall, director of studies at Victoria's Yarra Valley Church of England School in Ringwood, introduced an advanced programming course into the computer studies curriculum.



Vic Ryall and student Allan Deacon with their Spectrum-11 system.

The school had recently purchased a Spectrum-11B minicomputer with card reader and four interactive terminals, and had been running the MONECS (Monash University Educational Computing System) student batch software.

The object of the advanced course, however, was to provide an opportunity for outstanding students to extend their programming skills. Andrew Tuck (now a University computer science undergraduate) was the first to take the new course. A learning assignment to design a suite of programs that could be used in school administration for time-tabling, subject choices and student reporting, was set.

In 1980 a second student, Allan Deacon, took over from Andrew. Under the executive guidelines of Mr Ryall, he completed the assignment and the software package Students was born.

The classroom Spectrum on which it was developed is a PDP-11 compatible floppy

disk machine with a storage capacity of 630 Kbytes and a 64 Kbyte memory. It was designed and made by an Australian company, D.D. Webster Electronics of Bayswater, Victoria whose Spectrum-11 minicomputer range now includes some 300 installation sites throughout Australia.

Among these is a second computer at the Yarra Valley School, a Spectrum-11Z cartridge disc machine, which provides 10 Megabytes of storage.

Shortly after the installation of this machine, the school's administrators, on the advice of Vic Ryall, decided to run the Students package on a trial basis on the larger SP-11Z machine.

Its success has been overwhelming and it is now playing a vital role in assisting with timetables.

The total Students package is available from \$500, and separate sections are available individually for schools not wishing to purchase the complete package. ☐



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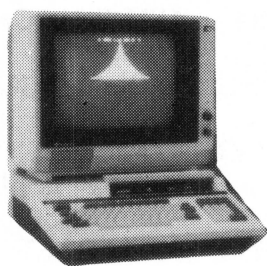
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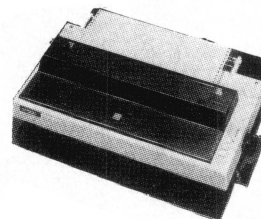
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commodore

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This is the best value and best performing typewriter/printer available giving superb quality print at a reasonable price. It even has its own built-in communication capability. So check with us for the full story. **\$1995.**



Totebuster Market

AUSTRALIA will be the main market for Totebuster, the world's first computer race analyser which allows punters to feed in their personal judgements.

In NSW in 1980-81 turn-over for legal betting on dogs totalled \$2224 million with \$1258 million invested through totalizators and another \$965 million through bookmakers.

The Totebuster race analyser has been developed by the New Zealand-based computer firm SMOP (Simple Matter of Programming) Digital Systems.

Mr Robin D. Churchman, manager of SMOP, says the fully portable Totebuster is the only race analyser which lets the punter set the priorities for each race, using personal knowledge and experience.

"The more knowledge you have the better, but in any case Totebuster will improve your chances.

"Totebuster's function is to assess, analyse and compare all the factors that go into picking winners," Mr Churchman says.

The CPU chip used in the device is the first of its type to be manufactured in the world. The Totebuster is the

only product in the world presently using the chip. The manufacturer of the chip, (NEC, Japan) actually brought the first production of this chip forward by six months to accommodate the Totebuster.

Totebuster is manufactured by Shinwa of Japan, the world's largest manufacturer of calculators. The thermal printer used is a Shinwa invention. SMOP has a world exclusive manufacturing agreement with Shinwa for it.

The research and development, tooling, masking of ROMS and CPU has taken in excess of a year to accomplish.

Recommended retail price of the Totebuster is \$289. A large market is seen among regular punters. □

Anadex Printers

ANADEx of Chatsworth, California has announced a new series of its popular DP-9500/DP-9000 printers tailored to the needs of original equipment manufacturers and larger dealers.

Contrary to its traditional approach of offering a fully optioned printer product at a 'barebones' price (giving the best price/performance relationship available), with the

'L' series Anadex can now supply a basic printer built up with specific options.

A spokesman from Bell and Howell, Australian distributor, said this was an aggressive move intended to combat the influx into USA and Australia of less featured, cheaper Japanese models.

It gives Bell and Howell the flexibility to offer a dealer with the interface/feature combinations he specifically requires to address his particular customer base, the spokesman said.

The Anadex Graftix-Plus printer range is said to be suitable for applications in personal computing, business and scientific computing systems, and advanced communications networks. □

Winchester Triples

WARBURTON Franki has confirmed that a 20cm Winchester disk drive with floppy disk back-up has been introduced by Zenith Data Systems for its business microcomputer systems.

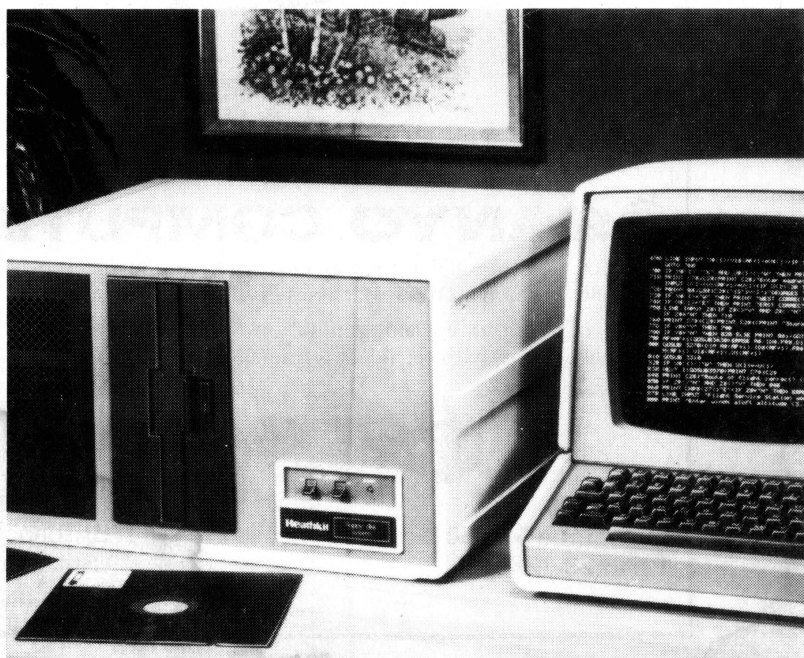
The non-removable Winchester in the new Z-67 increases the storage capacity of Zenith microcomputers to almost 10 million bytes (or characters), with the 20cm floppy diskette back-up providing an additional one million bytes.

"Software like our Peachtree accounting packages can now be stored on a single disk instead of multiple floppy diskettes, speeding a manager's access to information," says Barry Watzman, product line manager.

The Winchester disk also dramatically reduces the time needed to retrieve stored information by finding and transferring data at faster speeds than floppy disk systems.

"The increases in storage and speed bring the microcomputer into uses where a minicomputer might have been necessary in the past," notes Watzman.

The Z-67 features front panel switches to protect data on either the Winchester or floppy disk. □





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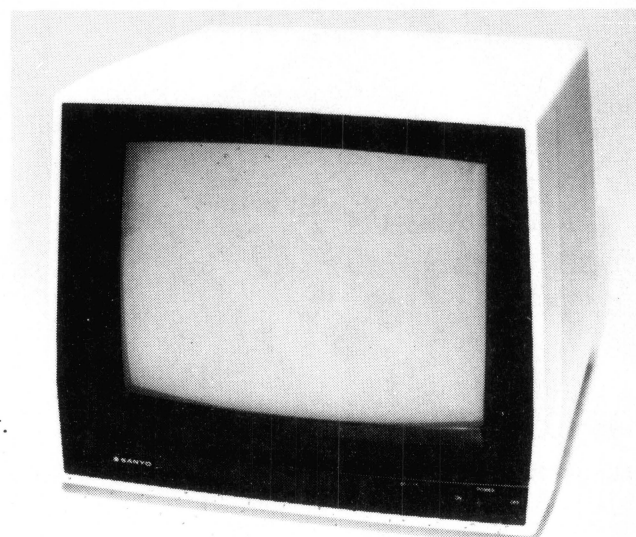
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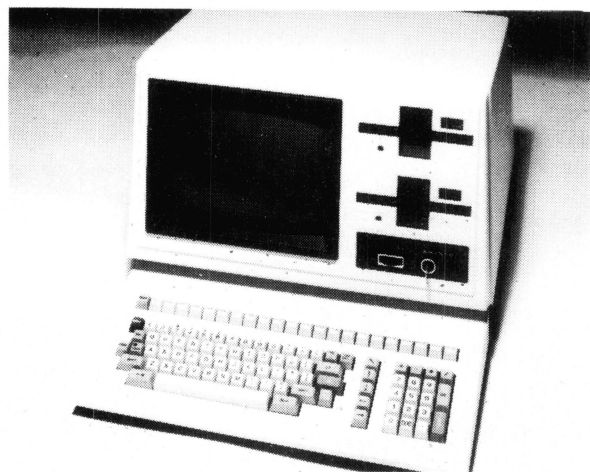
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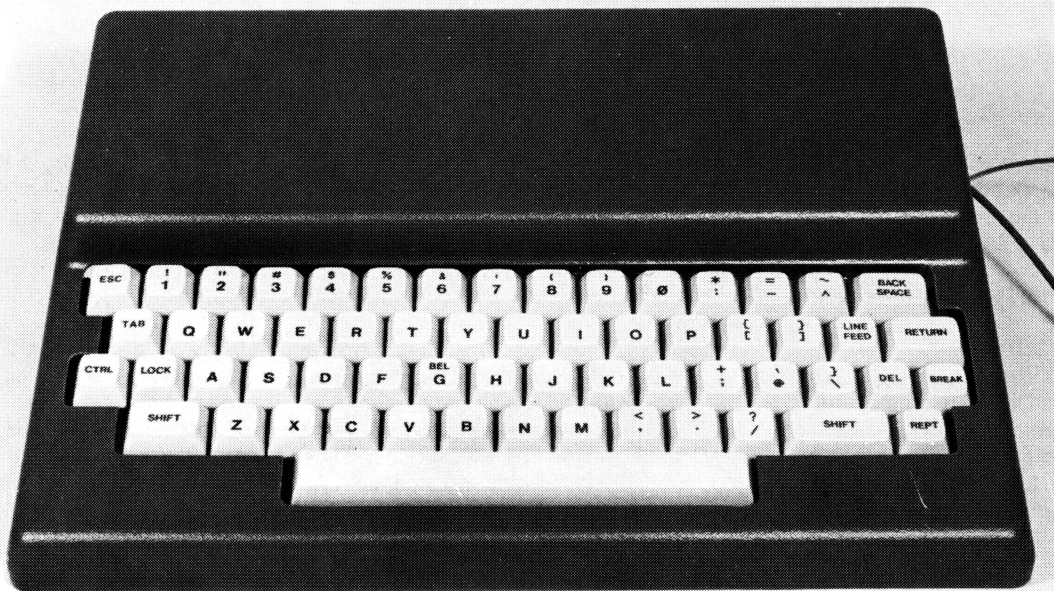
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Applied Technology's Bee-Line For Progress

This month sees the release of a significant new computer — Australia's own \$399 machine, Applied Technology's Bee. The full technical details of the machine are given in the pull-out section in the centre of the magazine. A few days before Christmas, we had a chance to talk to Owen Hill, the driving force behind the Bee. Les Bell reports...

APPLIED Technology has been supplying microcomputer kits and parts to the enthusiast from the earliest days — possibly longer than any other company. In recent years, its products have grown

increasingly sophisticated, up to large-scale S-100 systems with graphics. The latest venture aims to bring that sophistication to the low end of the market, with a low-cost personal computer.

The Bee grew out of AT's experience with its Z-80 based S-100 cards, combined with the realization that the economics of new technologies would allow the implementation of large systems at low cost, and some extra benefits. The result is an example of a new breed of personal computer.

The Bee is still based on the Z-80 microprocessor — that would be difficult to break from. But in most other ways it is different from previous designs.

First, it uses memory-mapped video display circuitry based on a 6545 CRT controller chip. The resulting 64 by 16 dis-

play is of high quality, easy to control, and software reprogrammable into other formats — such as 40 by 24 or even 80 by 24. The display circuitry is sophisticated and versatile.

A result of this versatility is the Bee's graphics capability — 512 by 256 resolution. Graphics commands similar to the Apple's are built into the BASIC to make graphics programming simple.

The display is monochrome (black and white) only, though that's no major drawback for a \$400 computer. Still, we asked Owen Hill why doesn't Applied Technology go the whole way and implement colour?

"That's a hard one. Essentially we decided colour reduces the resolution per line. We noticed that higher level languages generally required more than



40 characters per line (the practical limit of colour) and the need to expand to run CP/M virtually ruled out that option at this stage. The VDU in the Bee is fully programmable and should the need for colour grow we will introduce a colour version."

Programs Retained

The basic Bee comes with 16K of RAM. Significantly, it is CMOS (Complementary Metal Oxide Semiconductor) RAM, which has a very low power requirement, allowing a small battery to supply constant power to the memory. This means programs and data are retained even when the

unit is switched off. You don't even need a cassette recorder any more.

The 16K of ROM contains Microworld Level II BASIC. This is an extension of the BASIC reviewed in our December issue.

Hill comments: "A 16K computer with extensive BASIC is a very useful machine. Microworld BASIC incorporates in 16K of ROM, virtually all the ANSI keywords, graphics commands such as PLOT, both integer and floating point arithmetic and the ability to link to machine code, editor/assembler and other specific software.

"This appears to be the best solution

available. Don't forget Microworld BASIC contains extensive error messages which are far more powerful than most other ROM-based BASICs."

What is significant here is the ROM is located at the top end of memory, where it won't interfere with CP/M, which lives in RAM from zero up. And CP/M is a definite possibility in the near future. Expansion of the machine is simple.

Mechanically, the Bee is straightforward. It is constructed on two boards. The lower contains the processor, parallel I/O port, RS-232C port, keyboard, video display circuitry, cassette interface and

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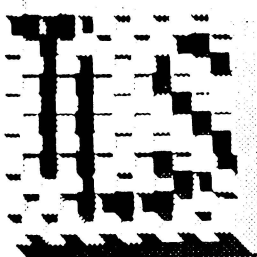
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power supply. Piggy-backing on top is a memory board with up to 32K of RAM and 28K of ROM. Hill told us several versions of this 'daughter' board will be available, supporting different configurations of RAM, ROM and peripherals.

For example, Applied Technology has been working closely with Telecom engineers on the design of an integrated modem for the Bee. This will be available later this year and will allow computers to exchange programs and data over the telephone network.

Selfish Computers

"As technology has advanced and costs have fallen there is a growing reality for each of us to be able to afford a personal computer. However, the same technology advances have produced the information revolution that is about to have an impact on all our lives. Should personal computers become as widespread as most industry observers believe, they will form the basis of an 'information window' for the owner by communicating with other computers and networks. This appears to be the technological breakthrough of the 80s," says Hill.

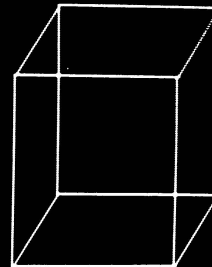
"Early computers were 'selfish', requiring the owner to expand his computer with disk drives, printers and other peripherals. Very few facilities for communication were made available for these early experimenters.

"Today the word is networking. Essentially this means a computer should have built-in facilities to communicate with other computers, either by direct wire or via telephone channels."



The man behind the Bee, Owen Hill.

```
06000 REM This subroutine draws a square of lengths l1,l2
06005 REM with the bottom corner at a1,b1
06010 VAR(A1,B1,L1,L2)
06020 REM Draw left side, then top, then right, then bottom
06030 GOSUB [ A1,B1,A1,B1+L2 ] 4000
06040 GOSUB [ A1,B1+L2,A1+L1,B1+L2 ] 4000
06050 GOSUB [ A1+L1,B1+L2,A1+L1,B1 ] 4000
06060 GOSUB [ A1+L1,B1,A1,B1 ] 4000
06999 RETURN
65000 END
```



Portions of lines may also be underlined for another effect,

e.g. This procedure must be followed at all times.

or in case of special notation ...

$$\underline{r} = \underline{a} \cos(\underline{w}) + \underline{b} \sin(\underline{w})$$

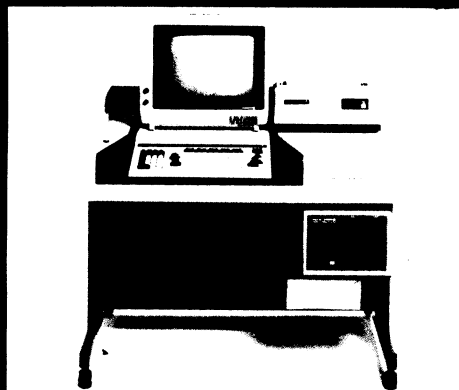
The verb in this sentence is swam

In addition to all these display features, the user can actually create his own characters for Greek letters, maths symbols, or it can even be used for quick, easy graphics.

For example a character of a stick figure could easily move around the screen, and focus attention on the right thing at the right time

See ...      

And ...      



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***Price includes Computer, Green Phosphor monitor, 80cps printer, Dual 5¼" Drives, Complete software, Controller, 16k Upgrade; many other options are available, all at very reasonable cost.**



The Bee, therefore, is designed not to be selfish; it is capable of a remarkable amount without any expansion. But by changing the daughter board, a Bee can have all the board devoted to RAM and interface to disk drives. Incidentally, the Z-80 bus signals are available at the back of the board and S-100 expansion shouldn't be too difficult, if it's necessary.

But it is the concept of networking which will unleash most of the Bee's potential. Due to its low cost, the Bee has attracted a

lot of interest from educational authorities — and it must be considered a leading contender for the position of a NSW Education Department contract for supply to schools.

Applied Technology is already planning the establishment of a demonstration classroom at Sydney's Burwood MLC Centre, where a number of Bees would be linked to a master network server (Queen Bee?) which could download programs and files from its disk drives.

Another important factor for the education market is the existence of hundreds of programs already written in Microworld BASIC. If that weren't enough, AT has a program which will convert Applesoft programs to Microworld BASIC!

Everyone who has seen the Bee thus far has been impressed. It's small, inexpensive at \$399 in kit form, and very powerful.

Could it be Australia's answer to the Apple? □



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LINTON-SIMPKINS

IMAGINE if someone were to install 2000 terminals around Sydney linked to one or other of the videotext systems currently being touted about.

These 2000 terminals would provide free public access to tourist and visitor information data banks. A wonderful idea you might say; but if you did say then you can be certain that within seconds of your words being heard many people would happily explain why the idea is legally impossible or economically unsound.

To be honest, there is also the absolute certainty that within hours of installation most of the terminals would have been destroyed. Their destruction would have been part of some sort of inarticulate cultural protest, like burning antique trains, scraping coins along beautiful cars and the protest against city decadence demonstrated by rural visitors to my suburb kicking over garbage cans.

On the other hand the destruction of something like a terminal could be simply because we lack the coordination and manual dexterity of other races. Australians can't even seem to drink beer in commercials without dribbling!

In contrast to Austalians who smash electronic things like telephones on sight, the more civilised if colder nations seem to be able to live in relative harmony with electronics. Terminals have been in use for years in West Germany to provide free public access to information banks without protest or damage.

Many West German cities have terminals at their rail stations to provide information about train times, fares, departure platforms and least-time routes.

Now the city of Toronto (the one in the Canadian province of Ontario, not the one on our NSW powerhouse coolant-lake, dolt) has moved to install 2000 terminals to link up with Canada's version of Teletext/Prestel/Seven Text. It's called Telidon.

Frankly, of all the systems I have seen I prefer Telidon and the Canadian habit of having all the paragraphs in a story in the 26

same colour, rather than the paint-factory explosion shown on our screens in Sydney. (That's Sydney NSW, not Sydney Ontario by the way.)

The government of the province of Ontario, tantamount to our state governments (at least in theory), has decided to put up the money to buy, install and link the terminals via special telephone connections to the data base computer.

Toronto Blues

But since I am a kindly man, I hope the terminals are cold resistant and there is some way of warming up the keys, or the users might become rather attached to one in winter. Toronto is colder than you would believe. Even Santa Calus puts on an extra cardie when he calls — and you know what he's used to. Then there is the local children's song — "Blitzen The Blue-nosed Reindeer". . .

In some attempt to minimise icing up, the provincial government and the local metropolitan authorities have decided the terminals will be installed in places like hotel lobbies, tourist attractions, shopping malls and provincial and federal government tourist centres. Installation of the 2000 terminals will be complete by the middle of 1982, for the Canadian summer.

It is planned that 50,000 pages of information will be accessible from the terminals and initially about half of the visitors to Toronto will have access to the database.

By the way, if you are one of the 50 percent the system reaches, don't make the mistake of feeding the squirrels in the parks. The animals wholeheartedly approve but the police demur and you can get a ticket. Feeding the squirrels out of season is punishable by a sentence of not less than 50 or more than 100 years in Newfoundland.

Information in the database is provided by any company or organisation that wishes to provide it and to pay the fee necessary to gain entry. The government is only putting up the hardware money and providing a few sites, the rest is a

straight commercial venture by a firm called Infomart, which runs the database computer.

Local Version Doomed?

It's beginning to look as if any Sydney version is doomed right from the start doesn't it? Sales of listings on the Australian systems so far have failed to set the advertising world alight, even though what we are talking about is a television show without the show, leaving only the essentials (the commercials).

I wonder will the local guide offer such invaluable advice the Toronto version does with how to avoid local comedians Wayne and Schuster; how to contact the man in Toronto who offers to train you to combat readiness for the coming major breakdown in law and order; where the international Erotic Art Institute is located; how to avoid seeing the display which measures the deflection in the wind of the CN tower and how to get to Niagra Falls to end it all.

To cap it all you could climax your visit to Toronto by taking Assertiveness Training. "Private Chuzpah (sic) Lessons. Are you too nice for your own good?" (Yes, too true, help me Phyllis Zelcer BA.)

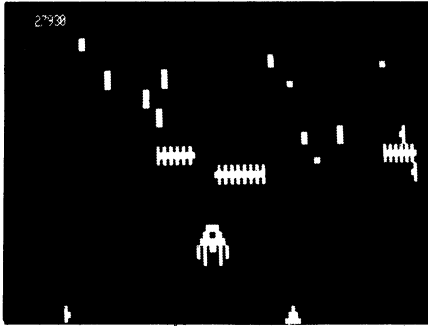
Or you could visit Closet Interiors. Perhaps you'd like to ship your no-neck monster off to the children's Television Studios — Acting Camp. But then they may not be acting. Anyway it's all going to be available to you mid 1982 and all you have to do is go to Canada and not stop at Vancouver.

Infomart, the owner of the database computer and the sales outlet for the pages — that is what amounts to ads — is described as being Canada's biggest electronic publisher. But in a spirit of goodwill that transcends the borders of commercial competition, local print publishing house the Toronto Star has said it will invest about \$800,000 in conveying its 'Star Guide' on to the Telidon system. Free enterprise in Toronto is alive and well, if shivering. □

ARCADE FAVOURITES

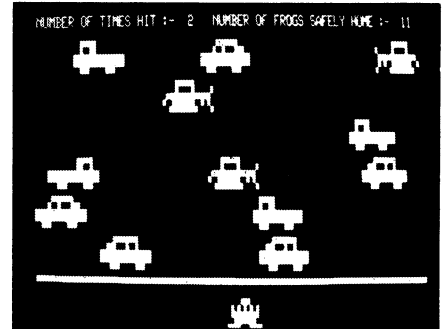
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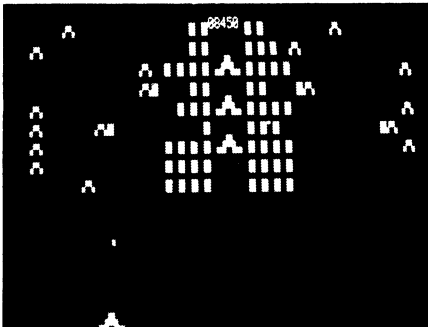
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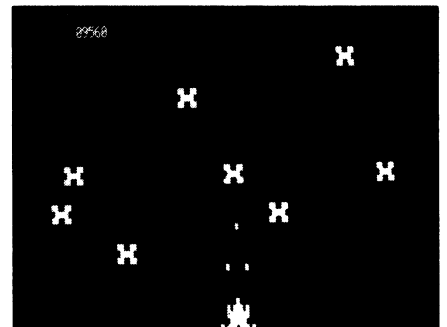
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MAKE YOUR HOBBY PAY- Write for Your Computer-

Okay, it's how-to-get-rich-slowly advice time... Editor LES BELL, who says he'd rather sleep than fill the magazine every month, tells how to write magazine stories — so you can feel confident contributing to Your Computer.

The incentive? Fame and fortune, of course!

ROBERT HEINLEIN once said: "Writing isn't necessarily something to be ashamed of, but do it in private and wash your hands afterwards".

For a man who makes a comfortable living out of writing, he must have awfully wrinkled hands!

Actually, when you get down to it, writing is quite enjoyable. As a journalist, writing for a living, I have to admit that even those occasions when it's a bit of a slog are compensated when I see the finished article in print. There's a certain satisfaction in seeing your handiwork committed to permanence on paper. It's also a good way to make some spare cash to pay for that new disk drive, green screen or whatever.

As the leading magazine in a rapidly growing field, *Your Computer* is constantly on the lookout for material to publish. As you can see by flipping a few pages, we have a lot of material in every issue and not all of it is written by the office staff. We can't be experts on everything, and there are many topics about which some of our readers know more than we do (most things, to be honest).

In particular, there are several models of computer with which our readers may be more experienced. Our office computers are Apples and S-100 systems, and these are the machines we tend to use to develop software or use to illustrate points in articles. So if you have one of the machines we haven't yet added to our office 'fleet' you may be feeling a little left out in the cold. Here's your chance to do something about it.

If you have had your machine for some time and learnt a bit about it, you'll have all kinds of opportunities to write articles — thereby achieving both fame and fortune (I mention the latter because even I won't do something for nothing!).

As an example of all the possibilities, you've probably bought some pieces of software for your computer. After using them for a while, you're ideally qualified to write reviews of them. Maybe you've added some hardware or made some modifications. There's a story too.

Kipling's Advice

Good writing for technical publications is not difficult. The basics may be summed

up in a short rhyme written, I believe, by Rudyard Kipling:

I keep six honest serving men,

They taught me all I knew.

Their names are what and where and when

And how and why and who.

This is a reminder to put the salient information into the article. In writing a review, for example, you should answer the following questions: what exactly is the product?; where can I get it?; when did it become available?; how does it work?; why would I use it?; who would use it? The 'how' might also remind you of 'how much does it cost?'.

Write down an outline of your article before you start. If you're using a word processor, you might like to try my technique: I type in all the section headings first, then subsections if necessary. Then I use the word processor in 'insert' mode to write the actual text of the article between the headings.

But before you commence writing, form an impression in your mind of the audience you are writing for.

If you are writing a 'how-to' article for beginners, don't make assumptions about their knowledge or previous experience. If, on the other hand, your article is entitled 'The Use of Simple Precedence Grammars in the Construction of a Pascal Compiler', then you can legitimately assume a higher degree of knowledge (and possibly a higher degree) in your intended audience.

The Beast Rears its Head

This brings me to the subject of jargon, the many-headed beast which seems to cause so many sleepless nights for technical writers. A sensible approach is needed here, to take account of the difference between technical terminology and jargon.

Terms like hex, software, UART and so



on are technical terms, without which any explanation would become unwieldy and stiflingly verbose.

Long sentences are even worse than concise terms which may initially send the reader rushing to the Glossary, but which thereafter cause no difficulty. For example, compare:

"The metal-oxide semiconductor integrated circuit which contains asynchronous parallel-to-serial and serial-to-parallel conversion circuitry, together with parity generating and checking circuitry and error flagging outputs, is connected to integrated circuits which translate the +5V logic levels into +/- 12V signals, and vice versa, and thence to a 25-pin connector."

and
"The UART connects to an RS-232C interface".

The first version isn't any clearer, and leaves the reader drowning in a sea of words. The second version sends the reader hunting for a technical dictionary or glossary, but once he has satisfied himself that he knows what UART and RS-232C stand for, he can carry on. And he'll understand them next time he encounters this technical shorthand.

Habits to be Avoided

Engineers and scientists, by and large, do not invent jargon. Journalists and publicists do. As an example of jargon at its worst, at YC we have banned the use of the hackneyed term 'silicon chip', redolent as it is with suggestions of automation, unemployment, and a vaguely troubled, economically chaotic future.

We'll leave that kind of writing to those who are still over-awed by the stupendous power of the 'micro-chip'. Obviously they've never tried to write a simple program on a microcomputer!

There are a few bad habits we all acquire in writing: redundancy ('horizontally level'), superfluity ('numerals are used to identify'), vitiated verbs ('provides continuous indication of' vs 'continuously indicates'), verbosity ('is provided with' vs 'has'). Don't worry about these (I often don't!); that's why we have sub-editors -- they clean up the obvious lusus. What they leave is your writing style, without it your writing is characterless.

If you're keen on doing a really good job, there are lots of good books on technical and general writing you can read at your leisure.

Future Features

In the feature area, we are particularly interested in 'How-to-do-it' type articles. Even better are 'Here's-how-I-did-it' articles.

Many of the articles we are running at the moment are written in response to questions from readers. And as we have

so many articles to write, we often don't have time to explore the subject in depth. Working on a project for your own amusement, however, you can spend much more time on it and give a more complete and balanced treatment.

As well as these tutorial articles, we welcome articles on business topics, not so much in the 'How-I-did-it' vein (though that's still important) as 'See-it-can-be-done!'. Many small business users could use a little encouragement in getting their own applications developed. Seeing someone else's success story is a great help.

For tests and reviews we generally obtain samples of new computers on the market. This is done by our own staff. However, it is impossible in the space of a few days to use every feature of a machine, or to learn all there is to know about it. That's where the experienced owner can be a great help.

If you've owned your machine for some time (say, a year or more), then you've probably encountered its significant limitations and come to appreciate its finer points. More importantly, you'll probably know how much software is available and how good it is, and who the main suppliers are.

A detailed review of all these aspects of a machine is impossible in the time we have available, but it is just what the prospective purchaser needs. Obviously, we can't run such reviews on new machines, or on machines that are no longer current. But that still leaves a lot of machines.

Reviews should include our standard 'report card' as well as a prime number generator or similar benchmark. And of course, despite the fact that you own the computer, your review should be as impartial as possible. 'Rave' reviews tend to be dismissed as misguided over-enthusiasm by the critical reader (and that's most of us). Good reviews are honest about failings, where failings exist.

Similar guidelines apply to software items and books. Put yourself in the position of a prospective purchaser of the product. What does he want the product to do, or what information is he seeking? How well does the product meet those criteria?

Software Contributions

We are especially happy to receive software contributions from our readers. One of the best ways to learn to program is by reading good programs.

There are a few simple rules which apply exclusively to programs intended for publication. The most important, by far, is **comment your programs!**

Remember, the majority of readers who see your programs will not be able to run it without modifications. Some will not be able to run it at all (especially Pascal, FORTRAN and C programs), and may just want to read the program to see how it works. You can help these readers a lot by including explanatory comments in your program.

Second, if you can, pretty-print your program. That is, indent FOR-NEXT loops, comments and so on. This makes it



easier to follow and easier to translate.

Third, if it is a long program, provide us with a machine-readable copy (cassette or disk). This will enable us to try the program out, which we must do before accepting it for publication. If we have to type it into a computer by hand, we'll keep putting the job off and it'll never get done!

If you are providing a listing, then use a new ribbon to provide black print on plain white paper. In general, we prefer listings to typed copies as they avoid the inevitable errors which creep into human transcriptions. If you don't have a printer, please try to send us a cassette or disk.

We often pay more for programs than for general contributions, in view of the amount of work that goes into them.

News Releases

And now a word for our sponsors -- the advertisers. If your company has a new product, let us know about it by sending us a news release.

The rules for writing news releases are the same as for writing articles, but as much information as possible should be put in the first few paragraphs. When we

have to cut news stories to fit, we cut from the bottom up, so if the key facts are there they'll be in the story. If it gets too difficult to put your release in shape, someone else's will go in instead.

News releases with an accompanying picture (good quality black-and-white prints preferred) have a much better chance of being printed.

Everyone thinks that their latest product is the greatest thing since sliced bread, but in the cold hard light of the editor's desk, some just won't make it. That's life. We do file information away, however, to deal with reader's enquiries. So the information is not lost.

Ah, the Pay-Off

We can accept articles in several different formats. The 'standard' form is typewritten and double-spaced, with a wide margin at the left. This is the standard format for editing with a red pencil.

These days, however, we are receiving increasing numbers of articles on floppy disk. We can currently accept Apple disks in most Applesoft or CP/M formats, as

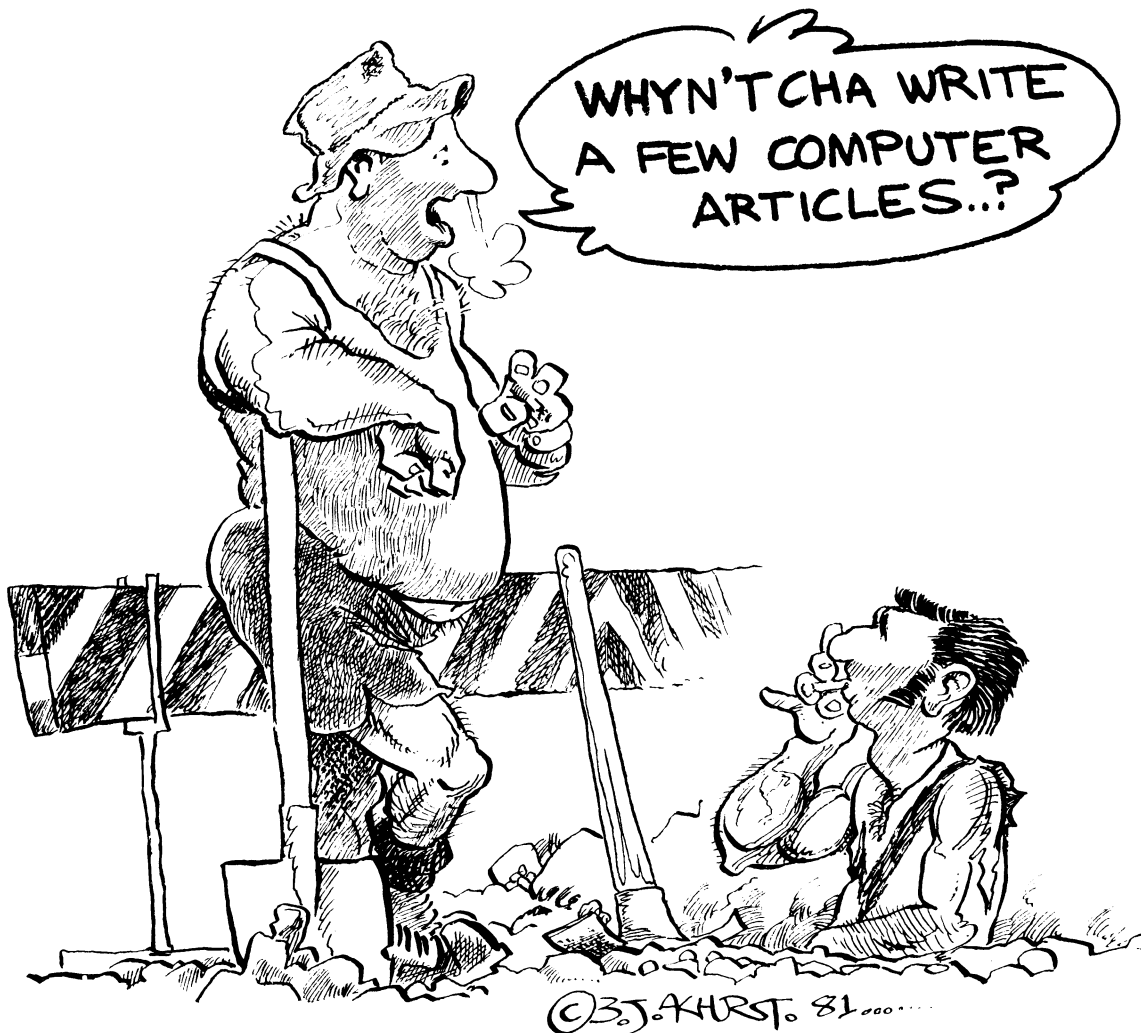
well as 20 cm (eight inch) SS/SD disks either in WordStar format or any other kind of CP/M text file (we have programs to strip out carriage returns inside paragraphs and other tricks to let us handle text files).

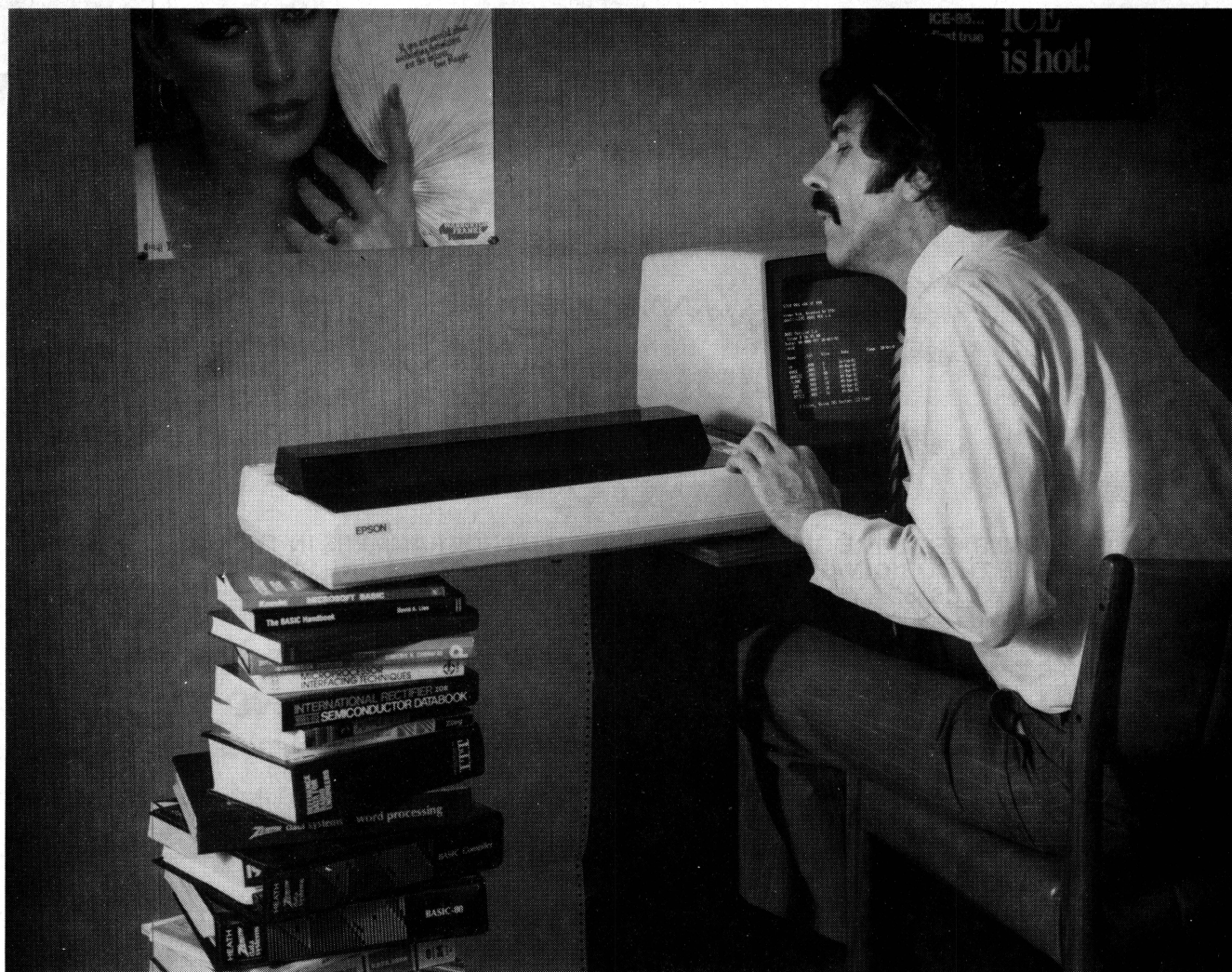
Recently, we have started accepting copy over the phone lines, via modem. If you have a 300 baud modem you can send us articles that way, too.

Once we've had a look at your article, we'll usually accept it. But we may have to reject it for a variety of reasons: we already have an article on that topic, or it may not be suitable for the magazine, or it may require drastic rewriting (not many do).

If we reject an article, and we haven't had to yet, we'll always explain why. If we accept, we'll let you know. When the article appears in the magazine, you will (as long as the bank account is looking good) receive a complimentary copy of the mag, and a nice fat cheque.

So there's one way to make your hobby pay for itself...would anybody like to write an article on some others? □





The MX-100. Not just better. Bigger

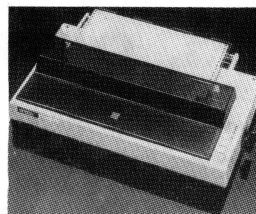
Epson

Our MX-80 was a pretty tough act to follow. I mean, how do you top the best-selling printer in the world? Frankly, it wasn't easy. But the results of many sleepless nights will knock your socks off. The MX-100 is a printer that must be seen to be believed. For starters, it features unmatched correspondence quality printing, and an ultra-high resolution bit image graphics capability. Then the ability to print up to 233 columns of information on 15" wide paper to give you the most incredible spread sheets you're ever likely to see. Finally, to top it all off, a satin-smooth friction feed platen and fully adjustable, removable tractors. And the list of standard features goes on and on.

Needless to say, the specs on this machine are practically unbelievable. But there's something about the MX-100 that goes far beyond just the specs; something about the way

it all comes together, the attention to detail, the fit, the feel. Mere words fail us. But when you see an MX-100, you'll know what we mean.

All in all, the Epson MX-100 is the most remarkable printer we've ever seen in Australia to date. How can you not afford to consider the new MX-100, even if you have to buy a bigger desk!



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The Apple Isle Shows The Way

Tasmania has always been in the vanguard of educational computing in Australia.

In this article, three teachers, ROGER McSHANE, SCOTT BROWNELL and JOHN READ, discuss the state of Tasmania's educational computer network, summarise the latest developments in teacher training and computer courses, look at the effects of recent research into the role of computers in primary schools and outline some of the current projects in these schools.

TASMANIA has had a relatively long involvement with educational computing. It was the first State to establish an accredited Computer Studies subject and the first to develop a state-wide timesharing network for educational purposes.

This network now supports approximately 220 on-line terminals in all major population centres.

The focus for educational computing in Tasmania is the Elizabeth Computer Centre (ECC), which services the computing needs of the Education Department. The functions fulfilled by ECC include the development and maintenance of the network, the development of educational and administrative software, the provision of expert advice on computing to the department and the provision of advice and training to Tasmanian teachers.

The Director-General of Education receives advice on computing developments from the Computer Management Committee. This committee lays down general policy guidelines for development. It is the responsibility of the officer-in-charge of ECC to implement policy.

The responsibility for maintaining computer operations lies with the Senior Education Officer (User Services) and the provision of advice and courseware to schools is the responsibility of the Coordinator of Educational Computing. Both of these officers and their staff are members of ECC.

Network Developments

The Tasmanian Education Department Network (TASNET) services schools, colleges and administration offices through-

out the State. TASNET currently consists of one Digital VAX 11/780, three PDP 11/70s and two PDP 11/34s. The processors are situated in Hobart, Launceston, Devonport and Burnie and are connected by either remote 4800 baud or local one megabaud synchronous lines.

There is approximately 1000 megabytes of on-line disk storage, with off-line magnetic tape back-up storage also available. The 220 on-line terminals are connected to the nearest node by dedicated 300 baud or 1200 baud synchronous lines. All Further Education Education colleges and every high school (except one) now have on-line facilities. A typical college would have between six and eight terminals and a typical high school would have two or three terminals.

Software has been developed to allow the use of Apple II microcomputers as terminals for down-line loading Applesoft programs stored in a central micro library on the network. Major data bases are usually maintained on one of the Hobart nodes.

Users in other areas wishing to access these data bases can select the appropriate node during the log-in procedure. In this way a user on the system can gain access to any other computer via the network. This allows users to utilize their local node for day to day processing and access to shared data or other features on a remote machine. The networking has been achieved using DECNET phase II software, which has been enhanced to provide remote terminal support.

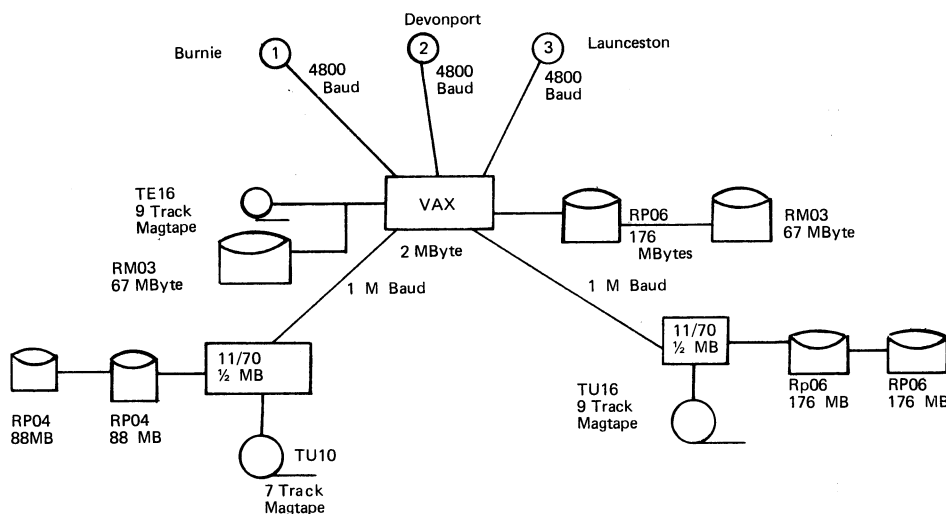
Administrative Applications

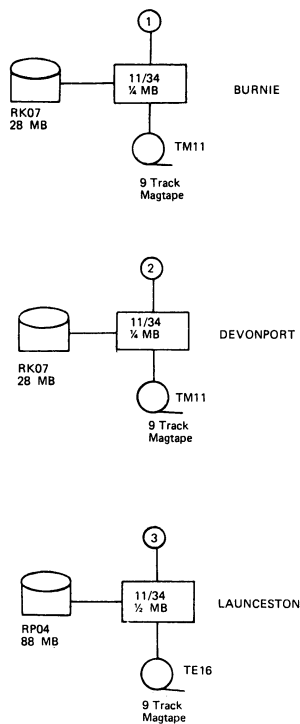
Tasmania has always been keen to exploit the resource sharing capability of an extensive computer network. A number of systems have been developed along these lines. Of course Education Head Office has used the network for conventional administrative applications, such as personnel and accounting. But we will outline here three examples which demonstrate how the computer network can be used for teacher support.

The first is **TASCIS**. It was developed as part of the Schools Commission project to improve the role of centralised library cataloguing by using a computer based-system in Adelaide. Tasmania decided to take the South Australian data and set up an on-line cataloguing data base.

This system now has more than 100,000 items available for on-line searching for any school or college with a terminal. Schools can request catalogue cards to be printed at the School Library Branch on high quality printer or can 'copy catalogue' from the computer terminal. Currently 15,000 cards per week are being printed on the central printer.

The **Tasmanian Media Centre** is the second example. The centre is the audio visual equipment branch of the Education Department and as such is responsible for the distribution of all films, slides, video tapes and kits. In 1976 the Elizabeth Computer Centre developed a computer based circulation system to control the circulation of the 10,000 items in the Media Centre's library.





Total Terminals = 222 as at 30th June, 1981.

This system was expanded in 1977 to allow any schools with a terminal to interrogate the system in a variety of ways. For example, a school may wish to run a course on computer awareness for its grade nine and 10 students. The teacher can ask the Media system for a list of films suitable for this level and on the subject of computing. Once useful films are identified, the system prints out details of their availability. The benefit of this system is to provide all schools with the same access to information, no matter how remote they may be.

The ISIS system is a computer-based aid to moderation. Teachers are able to select a test from a large item bank in their subject area and give this to their students. The computer then marks and analyses the test results and compares the students' performances with the State average for these questions.

The teacher is then given a report showing the raw and normalised results

for each student. This means the school is told how its students are performing, relative to the rest of the State.

The question profile is also updated as a result of each test, so the State averages always reflect the current student population.

Computing Courses

A wide range of computing courses, both formal and informal, are now available in Tasmanian schools. These range from the University-accredited Higher School Certificate Computer Studies to school-based computer awareness short courses.

HSC Computer Studies has been offered since 1972 and now has enrolment levels similar to many of the traditional subjects. The vast majority of students undertaking this course do their practical work on the TASNET system rather than microcomputers, due to the heavy em-



phasis on structured programming and file handling in the syllabus.

The most common programming language is Pascal, with BASIC-plus 2 and Extended BASIC also being used. The subject has a 50 percent internal assessment for the practical work and this is standardized against performance in a three-hour external examination. The subject is offered at level III or an introductory level II.

School Certificate Computer Studies is a formal, certificated subject offered to grade nine and 10 students in Tasmanian high schools. There is a heavy practical emphasis in the course, with students using a wide variety of pre-written packages as well as learning a programming language.

Students use either the TASNET system or a microcomputer. They are often introduced to programming through the Logo language before moving on to Extended BASIC. The subject is internally assessed by the school and moderated on a regional basis.

A number of schools have developed their own computer awareness courses or teach a unit in the Social Science syllabus entitled Technology and the Individual. These courses typically run for a term using two or three periods a week and do not concentrate on programming. The emphasis is generally on the social implications of computers with hands-on experience being directed towards the use of packaged software.

Teacher Training

The provision of adequate teacher training is seen as a vital factor in the growth of educational computing in Tasmania. Teachers need to gain an adequate technical background and then integrate this knowledge with the educational perspective necessary for best developing computing skills in children.

There are four ways in which teacher training is carried out, beginning with formal pre-service courses. The University Centre for Education (UCE) provides three courses for trainee teachers. The first is a Computer Studies Methods course for aspiring Computer Studies teachers who have gained at least sub-major qualifications in Information Science.

This course gives trainee teachers a rigorous introduction to such topics as course content, programming languages, classroom, terminal management and aspects of Computer-Assisted Learning, as well as providing details concerning the specific systems they will be required to use.

Students often take advantage of the second course, an optional curriculum unit in which a project is defined in conjunction with the lecturer and then carried out on an individual basis. These projects

often involve the implementation of CAL segments in a subject area of the student's choosing, or the detailed development of a teaching unit on an agreed topic.

The third course available at present is Computer Education for Primary Teachers. It requires no formal training on the part of enrolling students. This course is designed to show prospective teachers the way in which computers can be used in the primary classroom and to provide some technical training so the teachers will be better able to diagnose software and hardware problems.

The course concentrates on the use of microcomputers rather than network terminals as microcomputers are considered to be a more appropriate device for primary schools.

The second teacher training area is formal accredited in-service courses.

Tasmanian teachers are able to gain in-service qualifications, which are accredited by the UCE or Tasmanian CAE, by participating in courses provided by the centre for the Continuing Education of Teachers (CCET). Typically, a teacher would use such courses to upgrade a Diploma of Education qualification to a Bachelor of Education degree. These courses are mounted regionally and are usually held during the holidays, weekends or after school.

Computing teachers can enrol in a course called Computers in Education, an introductory course designed for teachers with few qualifications who wish to study the topic in more depth, or for teachers in other disciplines who wish to retrain. Discussions are underway to introduce a more technical course for practising teachers who wish to keep up with the latest trends in computing.

The EEC conducts a number of formal but non-accredited seminars each year for teachers in Tasmania (and interstate) schools. An important event is a week-long intensive seminar at the beginning of each year which provides an overview of the latest developments in educational computing. Some teachers also have the opportunity to attend seminars conducted by the Australian Computer Society.

A number of informal mini-seminars and occasional conferences are also conducted by the Computer Studies Teachers' Association. These seminars are usually very specific and are designed to assist teachers with day-to-day problems they face in the classroom.

Primary School Computing

The Tasmanian Education Department has accepted as policy the use of computers in primary schools in the areas of Computer-Assisted Learning, computer awareness and problem solving.

The policy supports the promotion of a computer awareness experience in primary schools, since there is evidence to

suggest that students' attitudes towards technology are formed at an early age.

During the 1980 Microcomputers in Primary Schools project, children in grade four and grade six were asked to write about computers. The grade four children simply described computers in a very neutral way, assigning neither 'good' or 'evil' to them. The grade six students however appeared to reflect prevailing attitudes in society by describing computers and their effects in a very negative way.

Two responses were:

Robots —
Origin unknown —
Bashing people —
Ordering people —
Taking over!
Smarter than the people in control.

Computers taking
Over.
Men and women losing their jobs.
Pity.
Unemployment —
The problem of the 21st century.
Everyone hopes computers don't
Run our
Society.

The objective of computer awareness courses at this level is to ensure that students develop balanced attitudes.

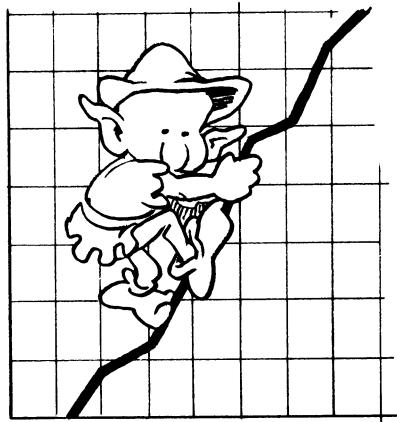
The third element of computing in primary schools is to use computers to develop problem solving skills. This is based on the premise that students will develop a better understanding of an algorithm if they set out the steps necessary to program that algorithm.

It is also hoped it will lead students to view problems in different and innovative ways. The major language used for this area is the graphics-based Logo, which is now implemented on the Apple II microcomputer; although some schools use the graphics capability of Applesoft BASIC to introduce similar concepts.

The important features of the Logo language are the restricted range of primitives (eg FORWARD, BACK, LEFT, RIGHT, TOOT, PEN UP, PEN DOWN, LAMP OFF) and the ability to define procedures then call them recursively.

Primary schools do not receive direct financial assistance for the purchase of computing facilities, but as with other sectors, software support and free maintenance are provided to schools which purchase recommended systems. For primary schools this is a 48K disk-based Apple II Plus microcomputer.

So to sum up, the field of educational computing is undergoing rapid changes, due to changing attitudes in society and to rapidly changing technology. As educators we must be prepared to anticipate these changes so we provide students with the best possible education in the future.



ELF Arrives!

Have Micro Statistics Come of Age?

by Dr George Phillipou

WITH THE rapid development of microcomputer technology we have witnessed a simultaneous refinement and expansion of software. Consequently, there are now numerous sophisticated software packages available in areas such as data filing, word processing and graphic displays.

The development of software in general is largely responsible for the universal acceptance of the microcomputer by the business world as a real alternative to the larger packaged software/computer system.

But one field where the progress of software has lagged is in mathematical software packages, exemplified by statistic programs in general. Statistics is an important technique applied widely in both business and academic research.

Most statistic software packages have offered a number of standard tests, including the common linear regression, mean, standard deviation, and such. The fact that most of these routines could be handled by a \$60 calculator did little to impart the view that the micro would be a serious challenger to those systems in the 'ivory towers'.

There are several reasons which can be advanced for this latter occurrence. First, the somewhat limited market for the micro stats packages can be visualized as being very dependent on microcomputer sales. Second, programmers with the required statistical experience were not available.

However with many large scientific/health institutions now purchasing microcomputers a demand has been generated, and this has accelerated the entry of suitable qualified people into the field. The

improvement is seen in software packages like the one reviewed here; a package which the writer feels provides routines to almost match those on larger mainframe computers.

The program is entitled 'Econometrics' Linear models and Forecasting', or ELF for short.

While the ease of program use and documentation (70-page manual) are good features, the user is assumed to have a working knowledge of the statistical routines involved. If not, a number of texts are recommended by the program author should the user need more explanation.

The early versions of ELF had a number of bugs, but these have been progressively corrected via the 'updates'. In fact, response from the Winchedon

Group (manufacturers of the package) to any queries has been rapid.

ELF has two main sections: Data Entry and Manipulation, and Statistical Routines. Within the latter group, the following are offered Anova 1 and 2; Correlation Matrix; Discrimination; Factor Analysis; Probability Tables; Linear and Multiple Regression; T-Test; Cross Classification Tables and Mean, SD, SE, Kurtosis and Skewness.

At present the program does not hold any non-parametric routines, but these are to be added later, as an ongoing update.

Data Manipulation

The routines for data manipulation are excellent and allow for correction, altera-

Software Report Card

Program:	ELF			
Made By:	Winchedon Group, Virginia, USA			
Useful:	Majority of statistic users			
Hardware:	Apple II/48K/DOS 3.3			
Ratings:	excellent	good	well, maybe	poor
Documentation:		✓		
Ease of Use:	✓			
Speed:		✓		
Support:	✓			
Value-for-money:	✓			
Price:	\$175			

tion or addition if necessary. Once the variables have been listed, data entry is accomplished via a screen window system, where the movement from variable to variable is controlled by pressing the space bar. If you have made an error, facile correction is available via the cursor. The data file, once created, can have further variables added, values corrected, variable names changed or new data appended. The data base may also be transformed via a 'compute' module, which uses basic commands such as $A2 = A^6 - 1$, where A equals the existing variable and A2 the new variable.

Where large quantities of data must be input, the user is given the option to use a numeric key-pad, which causes 123, QWE, ASD, ZXC to function as 789, 456, 123, 0.

While the data system has numerous notable features, the essence of the package is the statistical routines. In this respect, I shall dwell on only three, two of which (to my knowledge) have not been available on a microcomputer.

Multiple regression is a technique able to measure the importance of numerous variables on a result. For example, an avid horse-race follower may feel weight, last race finish, barrier and jockey rating are important factors in determining where a horse may finish.

These variables may be represented by

the formula. $RESULT = LAST\ RACE \times 1 + BARRIER \times 2 + JOCKEY \times 3 + WEIGHT \times 4$. By entering the data from many races ELF will:

- Relate the importance of each of his variables to the overall result and whether the variables satisfactorily account for the result.
- Provide him with a final equation which will allow him to calculate and then forecast where a horse may finish.
- Provide error estimates for forecasts.

There are numerous alternate applications of multiple regression analysis; but interestingly, it's known that several 'computer horse systems' are based on the above approach.

Factor Analysis

A routine seldom (if ever) seen in microcomputer software is 'factor analyses'. Correct interpretation and manipulation of which requires considerable experience with the method.

Factor analysis is concerned with reducing sets of variables which may be correlated to smaller subsets of one, two or three factors. While the nature of the factors is not explicit, this can be inferred. A further discussion of the options is possibly beyond the scope of this article, but to the knowledgeable user the features are nearly equivalent to those available on mainframe systems.

The final method I'll discuss is Discrimination. This routine is simply what it says. It allows you to discriminate between two alternatives. Again, an example may suffice.

If a person was interested in predicting the 'Pools' results, he may feel the last match result, the league ladder position and the number of previous scored-draws may all contribute to whether a team has a scored-draw. He would then assemble his data and test whether some or all of the variables were important in predicting a scored-draw, as against all other results (win, lose, goalless draw).

ELF would test each variable for suitability and define a separation between scored-draws and others. ELF then produces a 'probability' of each result and indicates those results which have been misclassified. That is, a score-draw when it in fact was (say) a win. From this type of data the user may estimate whether this approach would be more successful than pure random number generation.

While statistics has been considered the domain of academics, it has been my intention to show it can be applied to situations of general interest to the average micro owner. Furthermore, the availability of software, such as ELF, attests to the rapid proliferation of the microcomputer into all the major areas once considered accessible only to his 'big brother'. □

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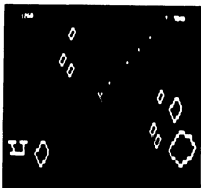
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PET 4016

FEATURES

The PET 4016 offers an IEEE parallel port and an IEEE-488 bus for disk and printer communications. Also included is an eight bit parallel user port with "handshake" lines. The PET supports two Commodore C2N cassette ports for external cassette input and output. Each PET 4016 includes 18K of ROM containing BASIC and a machine-language monitor. The BASIC interpreter is activated when you turn on your PET 4016 - no loading is necessary.

12" SCREEN

40 characters wide by 25 lines long.
128 ASCII plus 128 graphic characters
8x8 dot matrix characters
Green phosphor screen.
Brightness control.

KEYBOARDS

74-key professional keyboard.
Separate calculator/numeric pad.
Upper-case alphabetic characters.
Shift key gives 64 graphic characters.

MEMORY

PET 4016: 16K (15359 net) random access memory (RAM).

POWER REQUIREMENTS

Volts: 240v
Cycles: 50HZ
Watts: 100

SCREEN EDITING CAPABILITIES

Full cursor control (up, down, left, right).
Character insert and delete
Reverse character field
Overstriking
Return key sends entire line to CPU regardless of position

INPUT/OUTPUT

Parallel port
IEEE-488 bus
2 cassette ports
Memory and I/O expansion connectors

FIRMWARE

18K of ROM contains:
BASIC (version 4.0) with 9-digit floating binary arithmetic
Tape and disk file handling
Machine language monitor

PHYSICAL SIZE

Height: 14"
Width: 16.5"
Depth: 18.5"
Shipping Weight: 46lbs

Put Your Money Where Osborne's Mouth Is

Editor Bell has been following the introduction of the Osborne in the US with great interest. (No, he's not planning the introduction of the Bell B-1 computer, he just knows the Osborne will be available here soon.)

Meanwhile, we've also had a report from one of the first users of the new machine — he has unit number 53 — in the States. DANIEL MONTAGUE presents, after LES BELL's opening comments, our first all-electronic story — it was commissioned, written and delivered via computer, through The Source.

ADAM OSBORNE'S main claim to fame is he's even more addicted to sermonizing than I am. His pontifications appear monthly in sundry US journals under such curious headlines as 'From the Fountainhead'.

Many is the computer manufacturer who has suffered a verbal whipping from Mr Osborne.

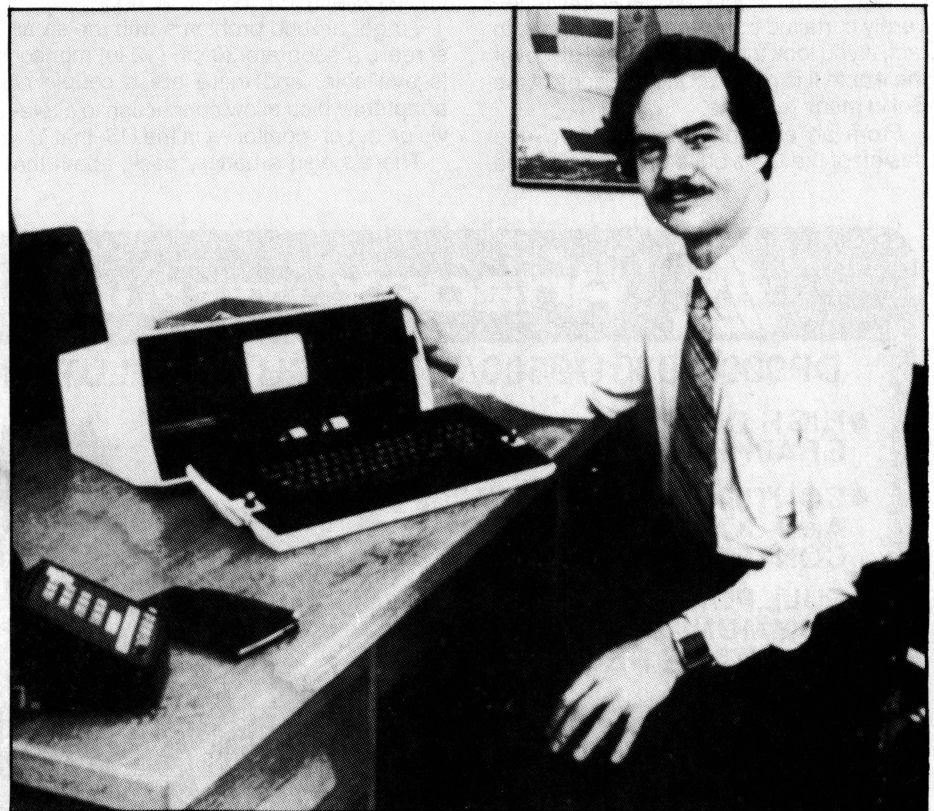
Now Osborne has put himself in a very vulnerable position, by launching his own computer company with an innovative product, the O-1 (better known as the Oz or Ozzie). He's been very subdued lately. People who live. . . , as they say.

The principal feature of the Oz is its low, low price — \$US1795. Yes, that's for the whole system — Z-80 CPU, 64K RAM, integrated VDU with 12.5 cm (5 in) screen, keyboard, serial port, and a stack of software: CP/M, WordStar with MailMerge, MBASIC, CBASIC-2, Supercalc.

One major factor behind the low price is the price of the software.

Normally, CP/M sells for about \$150. However Digital Research would, until recently, sell any manufacturer unlimited distribution rights for just \$US50,000. So sell 10,000 copies and it's cost you just \$5 a copy (plus the cost of duplication and documentation).

Similar arrangements can be struck





with most software houses. Consequently, the retail value of the software is high, but the cost to Mr Osborne (provided he sells enough systems) will be low.

The hardware is a different story. The Osborne was designed by Lee Felsenstein, a seasoned traveller in the micro design game.

Felsenstein was the designer of the Processor Technology Sol, which, had it not been for the untimely demise of Processor Tech, would probably have severely curtailed the spread of the Apple. In fact, if you look at it closely, you'll discover the Apple II is really a Chinese copy of the Sol in many respects.

From an electronic point of view, the design of the Oz is quite neat. It has some

very nice functions integrated into it; for example, the screen emulates a Tele-video 912C terminal, providing full cursor addressing and other smart functions. However, it's on the mechanical side that the problems arise, as you can read in Dan Montague's article.

The Oz is really a consumer product. It's a \$1795 computer, and it's built down to that price. Originally the price was to have been \$1495; but not even Osborne could believe that it could be done.

To get around problems with the small screen, a separate 30 cm (12 in) monitor is available, and there are a couple of adapters which allow connection to a television set or monitor — in the US, that is.

There's also a battery pack, about the

size of a binocular case, which sells for around \$250. An 80 by 24 display will be available some time in the second quarter of 1982, and there will also be a double density update for the disk drives.

There's already plenty of US software available in O-1 format. Lifeboat, for example, has all its software available for O-1s. □

Dan Montague Reports...

THIS PAST MAY, I noticed an article by Adam Osborne entitled *An Industry Challenge :The Osborne 1 Computer*. After reading it I was convinced the Osborne company had been formed as some sort of personal vendetta against the micro-computer industry.

It reminded me of the "Tucker" automobile produced in the United States in the late 1940s. In that case, an almost perfect automobile was developed after investors provided hundreds of millions of dollars. But only 40 or 50 units were completed for sale.

It is somewhat ironic that the Osborne 1 delivered to me bears the serial number 53.

The article, in the "Microcomputing" issue of May, 1981, failed to stimulate much excitement on my part. However, I find anything in the way of consumer electronic devices irresistible.

As May passed and I completed assembly of a Heath H89, I became more deeply involved in the use of the micro-computers in small business applications, education and as a hobby.

Since much literature is and will be available, describing the hardware and software available in the Osborne 1, I shall confine my comments to those of a "user".

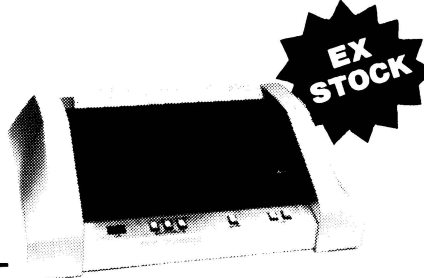
Since I already own a Heath H89 with



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H77 dual disk drives, and the H14 printer, I am still wondering what justifies the purchase of a second system, since as Osborne stated in his article, no two computer systems have compatible software.

Nevertheless, it was with great excitement that I took delivery of my Osborne 1. I had already had time to examine the unit on display in "The Xerox Store". If one looks closely at the photographs used in the advertising, one would expect to see metal latches to close the two sections of the carrying case. The prototype may have had metal latches, but economy must have dictated the final use of some very cheap plastic binders.

Once opened, the display is much the same as the photograph. A few modifications in the ventilating ports have been made, and the cable connecting the keyboard has been covered with a braided mesh protective covering.

Conveniently Portable?

In creating a portable system, the result has been inconvenience. I attempted to use the wordprocessing program with my Diablo 630 printer cable installed while I prepared a text. The clamp and cable protruded out over the keyboard and had to be disconnected.

The doors of the disk drives do not have the same firm feel of the Heath drive doors. In general, I approach the use of the Osborne as though it is fragile, and something may break off in my hand.

The Osborne comes with three software disks containing the CP/M operating system, Wordstar/Mail-Merge wordprocessing, and MBasic and CBasic. A note informed me that the Supercalc disk would be available to purchasers who received the system prior to August 1981. Once I file the purchase registration, that disk will be forthcoming.

As is my procedure with any new disk master, I loaded the operating system, prepared a new disk and began the copy process. Everything to this point seemed a unique experience. Unlike my H89 the keyboard lacked the "bleep" sound as I entered data.

The disk drives whispered quietly... until I was informed that the second drive 'B' was failing to write. After spending five minutes exchanging disks and swapping drive positions, drive 'B' began to function normally. This reminds me of the greatest shortcoming of the new system.

It is manufactured by a new company and repairmen all remark that they have never heard of the computer. I fear for the day when the system will require service. The first page of the "Users Guide" is a form to be mailed to Osborne, reporting a description of your problem. This is hardly the solution to the feeling of frustration one feels as the computer develops a problem in the middle of preparing monthly invoices.

Phone California

Since no-one in the "The Xerox Store" knew when the optional 30.5cm (12 inch) monitor would be available, I telephoned Osborne's office in California. I was informed that the monitor, battery pack, modem cable and double density disk-drive options would be available in "late 1981".

The 12.70cms (5 inch) monitor is wonderful for travelling, so long as the aircraft encounters no turbulence, or the car is travelling a smooth highway. However, my eyes ached after an hour composing a letter, while trying to search for errors.

The data is displayed on the monitor in a width of 40 columns. Once you type past 40, the entire display shifts to the left. You're able to view an 80 column by 24 line display by entering six control functions.

This has the effect one would encounter on passing a magnifying lens across a printed page.

After spending many hours testing the functions of the Osborne 1, I am convinced it will fill those expectations generated by their advertising. Nevertheless, I have yet to justify the purchase!

I had considered giving it to my 10-years-old daughter, as an "early Christmas gift". I want her to begin learning to use a computer for study. However, I am enjoying the system too much to pass it on to her. Once I receive the modem cable and 30.5cm (12 inch) monitor, I can alternate between the Heath and the Osborne...one system on Source and the other performing serious work.

Calls Forwarded

On the other hand, can you imagine a small office being closed and telephone calls being forwarded to the secretary's home!

A portable micro-computer would permit the secretary to prepare diskettes of letters and other typing tasks she would perform. She could continue to manage telephone calls and dial her boss at his home, as it became necessary. He in turn could compose drafts of his messages and either convey the data by telephone modem or disk exchange. These are just some of the applications the Osborne Corporation may provide in the future.

I am anxiously awaiting the modem connection. I want to test it with my mobile telephone! Since this data has been sent to *Your Computer* via satellite/source-mail, my next contribution may be submitted while I fish the waters of the Atlantic Ocean.....still trying to justify the purchase!

My final contribution to anyone wanting to justify the Osborne 1 is the fact that for \$US1795 I received a package that if ordered from Heath would cost just under \$US5400! □

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**UNIQUE SOFTWARE ON CASSETTE
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CONVERT -

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Just released! First full-scale adventure game for the ZX 81. Australian based and highly original, your mission involves time travel from ancient aboriginal times to space travel in the future. At Gloster Software we believe a real adventure game must offer a variety of situations, options and communicative techniques, use plenty of text to create atmosphere, be user friendly and plays different every time. Impossible in only 16K, this game occupies approximately 60K spread over 5 programs, linked by our unique data transfer techniques. Re-loading fits logically into game situations such as time travel. On two cassettes and requires 16K RAM.

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A Salute to Microcomputing's Model T



Old Computers Never Die...

Although Tandy/Radio Shack has released the new Model III version of the TRS-80, the old Model I is still being sold outside the US. Recently, LES BELL has been working with one — here are his comments.

THE TRS-80 Model I has established an enviable position as the most popular computer of all time, having outsold IBM's total production of computers — though not in dollar value, of course.

Recently retired in the US, where it failed to meet stringent Federal Communications Commission requirements for electromagnetic radiation, the Model I is still in production in Japan and seems destined for a long life.

What made the TRS-80 so successful? Basically, it's a consumer computer, designed to appeal to non-technical users, and it was introduced at a very attractive price. Since its introduction, a range of peripherals and upgrades has become available allowing the machine to be expanded into a quite passable business machine.

The machine itself is just a keyboard in a box, which also contains a Z-80 proces-

sor, 16 Kbytes of RAM, a cassette interface, and a 64 by 16 video display. The power supply for the unit is in a separate box and plugs in at the rear. Most importantly, there is a 12K BASIC interpreter in ROM (read only memory).

Officially, to expand beyond that you have to buy an Expansion Interface (a separate enclosure), although independent vendors can supply upgrades inside the keyboard unit. The interface contains

your computer REVIEW

a disk controller circuit, sockets for up to 32K of additional RAM, and connectors for a line printer and additional cassette recorder.

A variety of other peripherals is available, including a plotter and a speech synthesizer.

The basic machine had a few limitations the professional user would balk at — upper-case only display, limited keyboard, and the less than professional 80 by 24 display. Today, there are fixes available for every limitation; with the excep-

tion of the screen size, which is too closely related to the basic design of the computer to be fixable.

Imagination Captured

By advertising heavily, Tandy caught the imagination of many people who would otherwise never have dreamed of buying a computer.

The TRS-80 is easy to use. Just switch it on and you can talk to it in BASIC. There's a wealth of public-domain and low-cost software available, so you are never short of things to do.

The Model I is reasonably quick — the clock speed is 1.774 MHz. Microsoft's BASIC interpreter is no slouch either, bringing in quite a reasonable performance against minicomputers and time-share systems. If the interpreter isn't quick enough, a TRS-80 version of Microsoft's BASIC compiler is available.

For serious scientific work, where speed is a limiting factor, Microsoft FORTRAN-80 is available; and it's keenly priced, compared to FORTRAN-80 for other systems.

But the bulk of the software and hardware add-ons which have made the TRS-80 so popular have come from vendors totally unrelated to Radio Shack. I doubt whether Radio Shack's own word proces-

sor, Scripsit, has sold as many copies as Michael Shrayer's Electric Pencil, for example. And this has been the secret of the TRS-80's success.

As Tandy realised fairly early, there wasn't much it could do to stop people selling add-on peripherals and software for the machine. And in fact, it has turned out to Tandy's advantage. By releasing a technical manual detailing the TRS-80's internal circuitry and operation, Radio Shack actually encouraged independent vendors. The consequent growth of a software base that is the envy of other computer manufacturers.

This huge number of software and hardware companies has made possible magazines like Wayne Green's 80 Microcomputing, which is devoted to the TRS-80 and packed with advertising. This in turn, has called more attention to the machine.

In short, the TRS-80 succeeded for three simple reasons. It was the first low-cost, consumer computer. Second, Radio Shack had stores all over the US, and advertised and promoted heavily to sell the computer through those stores. And third, independent companies supported the machine.

The De-Facto Standard

It will never happen again. There can be no more firsts now the ZX-81 has trail-blazed the \$200 end of the market. Any new machine has to be better supported by the manufacturer, it has to compete in a crowded marketplace, and it has to have an instant software base. Just look at the reaction to the Apple III or the Radio Shack Color Computer.

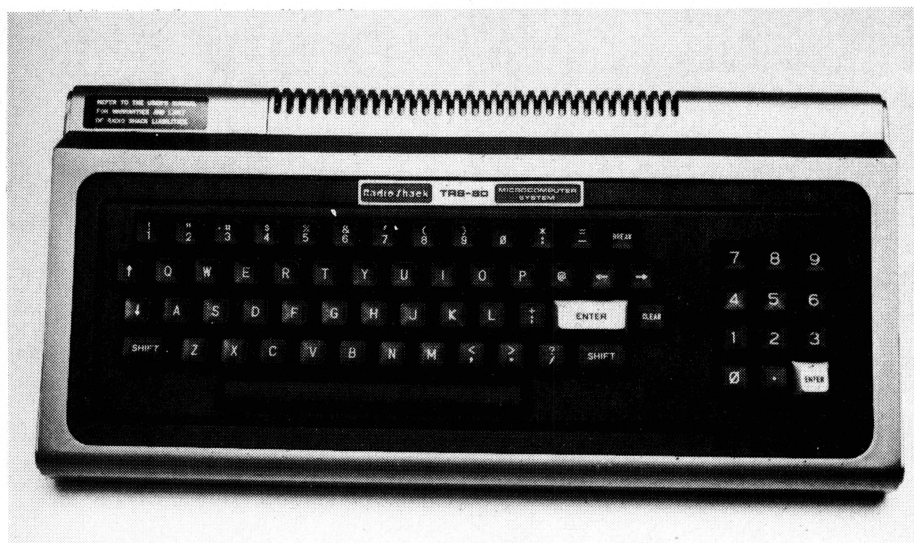
What does the future hold for the Model I. It's become a de facto standard in the industry. The Model III has had to conform to a similar memory map in order to take advantage of the huge amount of software available.

Ironically, Radio Shack is now in the same position as IBM with its System 360/370 architecture. Having created a standard, neither company can afford to abandon it, so future developments must be along the same lines.

The Model I is an excellent choice for first time computer buyers, simply due to the huge amount of software available for it. Regardless of the technical features of the computer, which are relatively unimportant, the fact is you can do a heck of a lot more using pre-written software than with most computers. You may not be able to do it as quickly, or as elegantly, but it will get the job done.

The TRS-80 Model I started life as a low cost computer with quite a few limitations. Today, with modifications, additions and fixes, both from Tandy and other suppliers, it has grown into a powerful system.

You could call it the Model T computer. ☐



Specifications and Report Card

Unit:	TRS-80 Model 1			
Made By:	Tandy			
Processor:	Zilog Z-80 or equivalent			
Clock Speed:	1.774 MHz			
RAM:	16 Kbytes			
ROM:	12 Kbytes			
I/O:	Integrated screen, keyboard, cassette I/O			
Languages:	BASIC			
Keyboard:	QWERTY type, nice feel			
Display:	64 × 16 upper case			
Graphics:	Chunky style, 2 × 3 blocks per character space			
Peripherals:	Cassette recorder, green screen			
Expansion:	Expansion interface, up to 48 Kbytes RAM			
Best Points:	Huge user and software base, tried and true design			
Worst Points:	Cheap plastic appearance			
Ratings:	excellent	good	well, maybe	poor
Documentation:		✓		
Ease of Use:		✓		
Functionality	✓			
Support:	✓			
Value-for-money:		✓		
Extras Included:	N/A			
Options:	Disk drives, more RAM, speech synthesizer, range of printers, plotters, RS-232C interface, and so on			
Price:	\$749			
Review Unit from:	Tandy Electronics			

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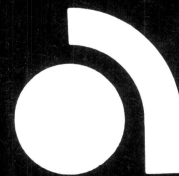
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You operate Type-'N-Talk™ by simply typing English text and a talk command. Your typewritten words are automatically translated into electronic speech by the system's microprocessor-based text-to-speech algorithm.

The endless uses of speech synthesis.

Type-'N-Talk™ adds a whole new world of speaking roles to your computer. You can program verbal reminders to prompt you through a complex routine and make your computer announce events. In teaching, the computer with Type-'N-Talk™, can actually tell students when they're right or wrong — even praise a correct answer. And of course, Type-'N-Talk™ is great fun for computer games. Your games come to life with spoken threats of danger, reminders, and praise. Now all computers can speak. Make yours one of the first.

Text-to-speech is easy.

English text is automatically translated into electronically synthesized speech with Type-'N-Talk™. ASCII code from your computer's keyboard is fed to Type-'N-Talk™ through an RS-232C interface to generate synthesized speech. Just enter English text and hear the verbal response (electronic speech) through

your audio loud speaker. For example: simply type the ASCII characters representing "h-e-l-l-o" to generate the spoken word "hello".

TYPE-'N-TALK™ has its own memory.

Type-'N-Talk™ has its own built-in microprocessor and a 750 character buffer to hold the words you've typed. Even the smallest computer can execute programs and speak simultaneously. Type-'N-Talk™ doesn't have to use your host computer's memory, or tie it up with time-consuming text translation.

Data switching capability allows for ONLINE usage.

Place Type-'N-Talk™ between a computer or modem and a terminal. Type-'N-Talk™ can speak all data sent to the terminal while online with a computer. Information randomly accessed from a data base can be verbalized. Using the Type-'N-Talk™ data switching capability, the unit can be "de-selected" while data is sent to the terminal and vice-versa — permitting speech and visual data to be independently sent on a single data channel.

Selectable features make interfacing versatile.

Type-'N-Talk™ can be interfaced in several ways using special control characters. Connect it directly to a computer's serial interface. Then a terminal, line printer, or additional Type-'N-Talk™ units can be connected to the first Type-'N-Talk™, eliminating the need for additional RS-232C ports on your computer. Using unit assignment codes, multiple Type-'N-Talk™ units can be daisy-chained. Unit addressing codes allow independent control of Type-'N-Talk™ units and your printer.

Look what you get for \$525.00. TYPE-'N-TALK™ comes with:

- Text-to-speech algorithm
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According to Haymes

Changing from the padded seat of computer user to the sparks and burns of computer manufacturer, merely due to curiosity, is a most unusual way of gaining answers. But then Sydney's John W. Haymes has always found that the best way of answering his own questions is to provide them himself, says reporter JENNIFER ADELSTEIN.

BUILDING his own computer was only the starting point for John Haymes in a diverse range of activities linked by the capabilities of the computer. They extend from John's specialised field of structural engineering within the coal mining industry, through to setting up a word processing bureau.

Along the way he has also managed to develop unique structural engineering software, install a complete hardware/software system and import an unusual typewriter keyboard.

Considering the nature and extent of his activities, one would think John Haymes had no time for mere mortals. With his illustrious credentials in hand, this humble writer prophesised quite wrongly that she would be ushered in to meet a presence who had set aside the English language in favour of higher tongues.

Not so: John is a very earthly specimen who has exploited his own curiosity. He

built the computer to serve as an outlet for his recreational energies, while utilising a time-sharing mainframe for his structural engineering operation.

Structural analysis, the mainstay of any structural engineering firm, was performed at the time-sharing service of CSA (Computer Sciences of Australia), to which John interfaced via telex. The generation of analyses and project management reports in this manner was extremely expensive and obviously, because of the telex facility, not interactive with the computer.

The next step, taken around seven years ago to put it into perspective, was the purchase of a Memorex 1280 computer terminal for the princely sum of \$3500. It utilised a telephone dial-up modem to interface directly with the CSA mainframe.

Using the Memorex, John developed a stock control and back order system for a client. At the same time he developed a burning curiosity to find out how and why a computer works. To satisfy this, John decided to investigate at grass roots level.

He purchased an Imsai 8080 computer kit, imported from the US. The kit required assembly and soldering of all the parts, with the exception of the memory boards. But as John says, soldering the 3000 joints of the boards somewhat takes the joy out of creation.

The kit was simple to assemble and the majority of components worked the first time around. The only problem John was unable to overcome was with the cassette interface board, which couldn't read the

cassette and prevented loading of the operating system.

No More Cassettes

The faulty board accompanied John on a US visit to the home office, where although the board was repaired it still wouldn't function properly. John then opted for two Siemens diskette drives with 20cm single-sided, double-density floppies and a Micromation Doubler disk controller. In view of the success he has had with the diskettes, he wouldn't even consider using cassettes again.

John can now rightly call the system 'his' collection of electronics, and in combination with an Intertec VDU and Qume printer, it provides a screen-based, interactive computer system. In its three years of operation it hasn't put a binary out of place.

John made a few small changes to the system; changes he says are mostly cosmetic. One is the perspex cover, replacing the supplied metal one from Imsai.

"I really like to watch it ticking over," John said. "And having a transparent cover gives us the first alert if something drastic happens inside the unit, like a fire."

He has also disconnected the diskette drive door locks, because of the noise they make when engaged. So long as no-one tries to pull out a diskette while the system is operating, there are no problem.

He also believes that as the system requires plenty of ventilation, dust could settle on both diskettes and boards, creating a heat transfer problem. Filters, not

\$495⁰⁰

THAT'S ALL YOU PAY FOR THIS REVOLUTIONARY PRINTER...

Cat. No. X-3252 P & P \$5.50

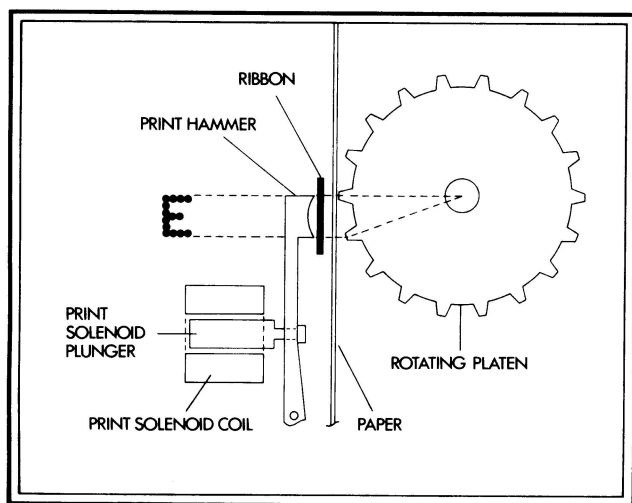


The Uni-Hammer Replaces Seven . . . or More.

Revolutionary? We don't know what else to call it. An impact printer with a single rugged hammer, rather than the seven or more individual solenoids and print wires found in conventional dot matrix printers.

At an incredible unit price of \$495!

Because of the unique Uni-Hammer design, the X-3252 is smaller and simpler than other dot matrix printers yet costs considerably less. Which makes it a natural for the personal or small business user who wants a quality, reliable impact printer at the lowest possible price.



A Product of the Seiko Group

It took a company such as the Seiko group, world's largest watch manufacturer, with vast experience in the design of small, intricate, precision products, to come up with a totally new concept in dot matrix printing.

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2,000 sheets continuous fan form paper to suit printer

Cat. X-3254 **\$27.50**

Replacement Ribbons

Cat. X-3253 **\$8.95**

How the Uni-Hammer Works

The X-3252, which prints both graphics and alphanumerics, uses a rotating platen with protruding splines positioned behind the paper (see diagram). The character or graphics image is created by multiple hammer strikes in rapid succession as the print head advances across the paper. The precision gear train assures exact positioning of the print hammer relative to the splines on the platen, to provide excellent print quality.

A Complete Printer

The X-3252 has features comparable to printers selling for thousands of dollars. These include upper / lower ASCII character sets, ribbon cartridge, 80 columns at 12 characters per inch, adjustable tractor feed, original and 2 copies, 30 characters per second, and full graphics with a resolution of better than 60 dots per inch in both horizontal and vertical axes.

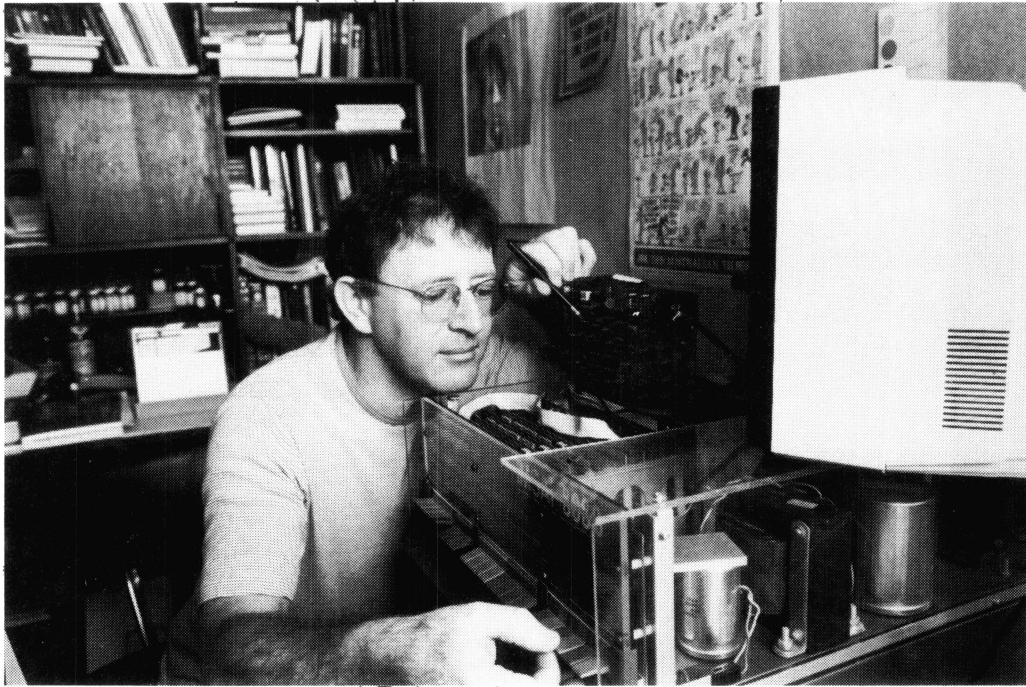
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John Haymes at work. . .

included with the Imsai kit, have been installed; but if the air becomes too hot in summer months and air flow resistance is created by the air filters, John will boost the speed of the fans.

"This will create marginally more noise, but we will just have to put up with that," John said. "In any case, it will be a lot quieter than hard disk."

The success of the computer as a unified system is such that not only is John able to perform all his own analytical work, he has branched out from the engineering capabilities of the computer into a fully-fledged word processing bureau.

The Processed Word

Known as Processed Words and under the management of Meg Evans, the bureau performs secretarial services and, naturally, specialises in engineering documentation. In fact, the company already has the building industry reference specifications on floppy diskette ready for boilerplating to any document which requires that information.

In the software department John looked no further than MicroPro International, starting with the WordMaster data and text editing package, and then WordStar, a word processing package.

Meg Evan's task of typing the specifications for the Birds Rock Colliery, a coal

mining development for the Electricity Commission of NSW for which John was engaged as a sub-consultant, was facilitated by the WordStar package and another MicroPro product — MailMerge. This sets up strings of information from both data and text files for boilerplating, and can also include any variables from the different files.

To further facilitate a professional job, a specialised dictionary of generic coal mining engineering terms was set up by Meg, based upon a spelling check program SpellGuard.

Although John Haymes is satisfied with these existing software packages, which fulfill his word processing needs admirably, his enquiring mind will not let things rest as they are regarding the structural engineering facet of the operation. With Richard Collings, another structural engineer with many years of experience in computers, John has developed two programs of an engineering nature in the FORTRAN language, for use specifically on small computers.

Merging their capabilities, Richard and John developed techniques using lists rather than matrices, to put large engineering programs onto small computers. This, John feels, is quite unique, and will enable many engineers to use small Apple and Z80 computers to run these

complex programs, rather than larger computer systems.

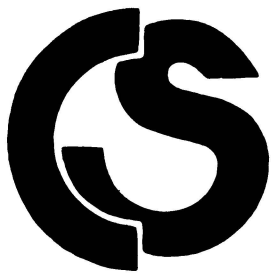
The first program, known as Tensys, is used to analyse large belt conveyors of around six km in length for collieries. The Tensys program analyses positions of pulleys based on load carrying requirements, and works out the tensions in the belt and the power required to handle the proposed tonnage of coal.

Structural Analysis

The second program, Microstran, is a plane-frame structural analysis on load cases — like wind, conveyor belts and men — on platforms and other allied structures designed to support weight and stress. The plane analysis will also be available for three dimensional or space frames. Post processing combines and sorts the load cases to give the vital tension results, without which we could again see horrendous structure collapses.

Time-saving benefits for engineers using Tensys can be illustrated by the few days required to complete the analysis on the computer, as against two weeks on a manual basis. Microstran software can perform plane-frame analyses in only 20 minutes.

The greatest effort involved in operating these programs is the data input. Once that has been accomplished, the data can



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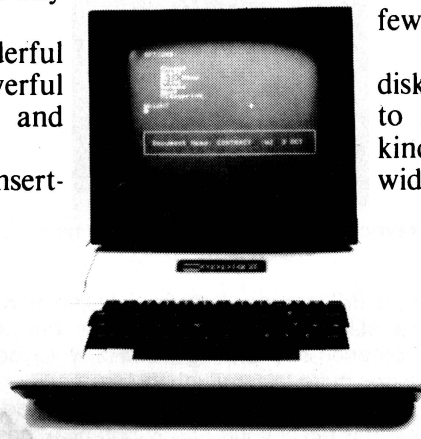
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requires a 48K, 16-sector disk-based
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Computer Solutions



Haymes imports the Writehand, a one-handed keyboard which could open up a new world for the disabled.

be manipulated in a variety of ways to provide answers to 'what if' situations. These accurate and rapid analyses will not only save time, but will assist in keeping design office costs down.

An inexpensive drum plotter, selling for less than \$1500, will be available to plot the results of Microstran and Tensys graphically on A4 paper. The Mauro plotter from the US will translate the numeric results from the VDU into graphic output. It is a device independent for output and visuals and will be marketed once again by John Haymes.

Home-Made System

John has found that his home-made computer system is very reliable. The

eight 8K memory boards, totalling 64K, are still going strong. He now has a Cromenco Z80 running at 2MHz, which he says is quite fast enough for his needs.

The computer, system, having developed far beyond hobby potential, has now become a very marketable proposition. John has completed his first hardware/software installation for Berkelouw, the antique book dealers with outlets in Woollahra (Sydney) and the picturesque NSW country town of Berrima.

The hardware system is a replica of his own, while a special software program was developed by John for the creation of catalogue cards. For each rare book Berkelouw stocks, up to eight index cards

must be typed, clearly defining this book — including author and subject matter.

Prior to installation, the same information had to be retyped a number of times on a typewriter — because the stack of eight cards for each entry would not fit into the machine. Due to the time consuming and repetitive nature of this task, only about 25 cards sets could be completed each day.

Now, on the computer with two floppy diskette drives and 48K on online memory, 100 book-card sets can be prepared daily. Information on those cards is sorted into alphabetical or subject order, prior to printing on the Qume daisy-wheel. In addition, catalogues are produced from the card images, which no longer have to be retyped so many times and money is also saved for the book dealers. At the present time cards are still being used for storage and retrieval of past information, but the future will see fully computerised information retrieval.

Stock Control Simplified

One problem which will be solved for Berkelouw upon full computerisation will be the records of past stock. These records are kept for reference. Maintaining a card for every book sold by the shops during the more than half-century in business has certainly created a storage problem, which will be rectified shortly.

The system has required service only once in the 18 months since installation, and Berkelouw feels it has cost-justified the computer within the first six months.

Yet another exciting avenue into which John Haymes has ventured is importing an unusual computer keyboard, which will be of particular interest to the disabled with some manual dexterity, or for those requiring one-handed typing, leaving the other hand free. With beetle-like contours, the Writehand as it is called, can be adapted for either right or left hand. It comprises four vertical rows of two ultra-sensitive buttons, each operated by the thumb, and four additional buttons, in a vertical line for the remaining four fingers.

It is ergonomically-shaped and is extremely easy to use once the operator has mastered the alpha-numeric arrangement of the buttons.

The four finger buttons operate on the principle of the binary code, and the Writehand can be used solely as an input device interfaced to a parallel port. John will be able to demonstrate the device by the time of publication.

John Haymes has been able to explore a variety of business avenues successfully, extending the capabilities of his computer to assist him. Building his computer started out as a hobby. But it is now providing control to the many different aspects of John's business; that is, until he builds another one... □



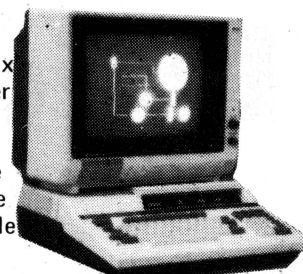
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It is time to put your
word processing program
away and use a
Word Processing System

See YC Dec for review

The LES BELL BASIC tutorial continues. . . And this month finds Les looking at ways to file away (and retrieve) data. The resulting program is a useful mailing list utility, so if nothing else you can treat it as a Pocket Program and lift it for your own use...

Basic for Birdwatchers

Part V

your computer



WE ALREADY know how to save and load programs. But our programs are going to be dealing with larger and larger quantities of data, and it's a good idea to have some way of storing that data on tape or disk so we can dispense with all this typing. This brings us to the concept of **data files**.

Data files are the same as the filing cabinets in every office, except they're more efficiently organised (I define a filing system as 'a system for losing things in alphabetical order').

The computer likes to know ahead of time what kind of information is going to be where. It doesn't know the difference between a name and an address, so if you tell it 'every fourth string will be a name, the two strings after it are address lines, and the final piece of data is a post code', you'd better keep your promise to the computer and organise the file that way.

Here's a few terms of data file parlance. A complete collection of related information, such as a name, address and post-code, is called a **record**. Within the record each item of information such as name, address line 1, address line 2 and post-code, is called a **field**.

On some computers, and in certain circumstances, each record must be the same length and the fields are of pre-defined length too. That may seem like a lot of bother, but it does confer certain advantages as we'll see. In the meantime, we're going to start with the lazy man's type of data files, called **sequential files**.

In sequential files, the computer doesn't care how long your fields and records are; it just reads them one after another, and the beginning of every field comes right after the end of the preceding one.

Here's how it works: imagine you

wanted to make an entry in a conventional paper file (actually, computer data files are 'conventional'; paper is passe). How would you do it?

You'd first of all work out where the file should be in the filing cabinet and locate it. Then you'd pull it out and open it. Then you read through the file quickly until you found the end, and then you'd make your entry. Finally, you would close your file and replace it ready for the next occasion.

Yes, The Same Way

You use exactly the same technique to access a sequential data file. First, you locate the file. Okay, so there aren't any alphabetical tabs on a floppy disk. But it's the operating system's job to keep track of what files are where, so you can rely on it to do that part of the job. Next, you open it with the command OPEN "I",1,"filename".

The OPEN statement requests the operating system to locate this file and keep tabs on it while you rummage through the contents. It also signals BASIC to set up a 'file pointer', which initially points to the beginning of the file, but

will move through it as you read or write the file.

The 'I' part indicates that you are opening this file for input; you're going to be reading from it. An 'O' would mean you were going to output to the file. Sequential files can be open for input or output, but not both.

This raises a minor problem. Opening a file for output sets the file pointer to the beginning of the file, so anything you write onto the file will just overwrite the previous contents. And you can't switch from reading to writing, thus eliminating the possibility of reading through until the end and then appending the new information (although CBASIC-2 allows this). So how can you append on to a file?

The answer is to read from the original file, and output a copy of this to a new file. After the first file has been read, you can forget about it and write your appended data onto the new copy of the file. So far so good. Let's get back to that OPEN statement.

Different BASICs allow varying numbers of files to be open at one time, typically up to 15. At sign-on, TRS-80 Disk BASIC for example asks you how many files you will be using. If you don't answer, it assumes a maximum of three.

Each file is allocated a number, when we open it. In this case, we've said our file will be file number 1. Finally, the last part of the OPEN statement is the filename itself, which can be either a string constant or a string variable.

Thinking time. Write OPEN statements to do the following:

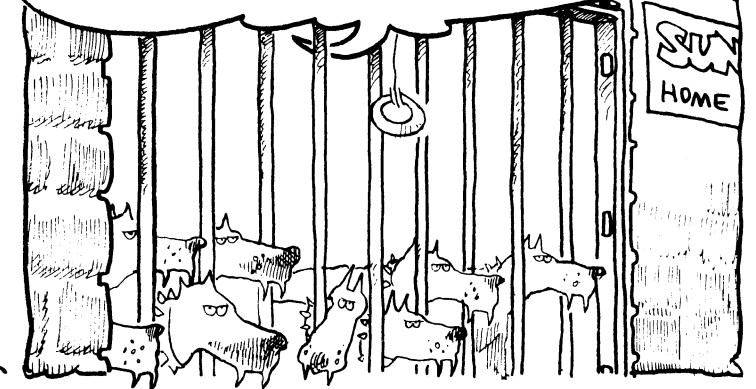
1. Open file DEALER.DAT as file number 3 for input.
2. Open file RAINFALL.FIG for output, as file number 2.

...WE ALREADY KNOW HOW TO
SAVE & LOAD PROGRAMS...



CBJ-AKHTJ.82

...THIS BRINGS US TO THE CONCEPT
OF DATA FILES...



...HEH...REMEMBER LAST MONTH
WE TALKED ABOUT, AH, COMPUTER
CLUB MAILING LISTS...

WELL, WE MUST NOW BE
ABLE TO STORE, RETRIEVE...&
ADD TO THESE LISTS...



THESE PREMISES
PATROLLED BY
Savage
GUARD DOGS.



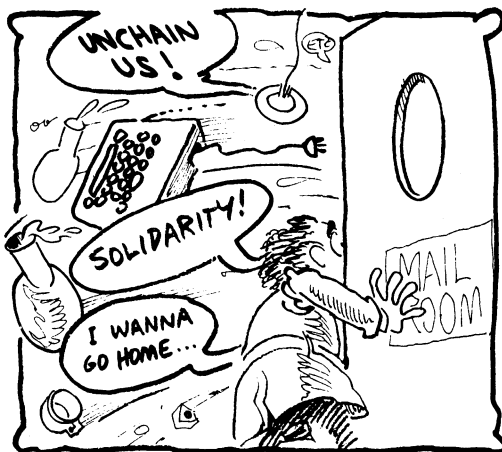
MAILING
ROOMS

SNAP!

ALL CORRECT
SIR...

GUARD

MAIL
ROOM



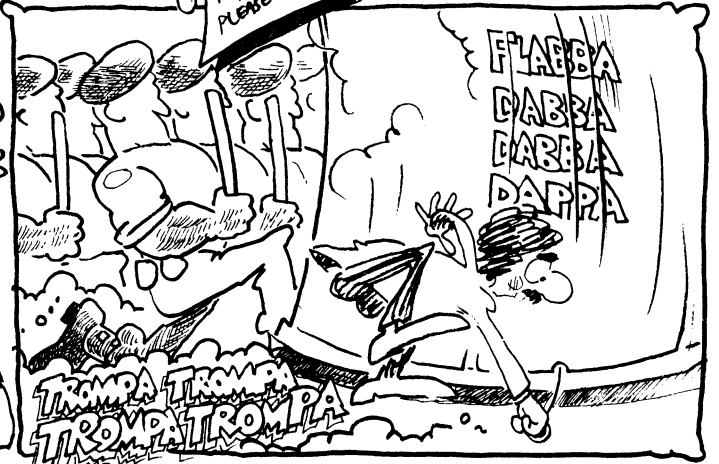
UNCHAIN
US!

SOLIDARITY!

I WANNA
GO HOME...



EXCUSE
ME



FLABBA
DABBA
DABBA
DABBA

TROMPA TROMPA
TIROPA TIROPA

... ANYHOW, READ THE TEXT...
AH... WORK IT ALL OUT... AND...
..UH...



HELP!

CRUSH

...NEXT MONTH, WE'LL
MOVE ONTO SOMETHING
NEW!...



3. Open file SALEFIGS.DAT for input, as file number 1.
4. Our program has already asked for the filename and stored it in variable F\$. Open the file for input, as file 1.

Dear Files, I'm Writing. . .

Writing to files is as easy as writing to the screen. Having assigned a file number to each open file, we now use a modification of the PRINT statement to write into it.

PRINT#1,A,B,C for example, will print the values of A, B and C into the file (in the usual 14-character wide fields). The statement PRINT #1,A,"B","C will print the three numbers, separated by commas, which is the best format to use if the numbers are to be read by a subsequent (you guessed it) INPUT#1 statement.

Obviously TRS-80 owners cannot use the PRINT@ statement to print to a file, because a file is only one-dimensional. It's a strip of characters, in sequence (hence sequential file). It consists purely of the data we write to it, with added spaces inside fields in cases where we separate printed values with commas.

It is possible to use PRINT #n USING to print to a data file though, as it simply formats the output for neatness. There are occasions where this could be useful.

Once the last data item has been written to a file, it is **closed**. This means the operating system writes out the last data to the disk, and updates the file's directory entry to reflect its new length. This is done using the CLOSE n statement, where n is the number of the file to be closed. Here's a simple example of this process:

```
270 OPEN "O",1,      'Open file for output
    "DATAFILE.DAT"
280 FOR N=1 TO 20    'Loop 20 times
290 PRINT#1 A(N);","; 'Output the variable
300 NEXT N
310 CLOSE 1          'Close the file
```

This segment of code writes the 20 values of A(1) through A(20) out to the disk, separated by commas.

The CLOSE statement can close more than one file at a time, simply by specifying the file numbers separated by commas. If no numbers are given, the CLOSE statement will close all open files.

Reading A Sequential File

Now we have the 20 variables stored in a disk file, we will want to read them back. How is this done? It's exactly the same as writing, except the file is opened for input, and we use the INPUT#n statement. So:

```
130 OPEN "I",1,      'Open file for input
    "DATAFILE.DAT"
140 FOR N=1 TO 20    'Set up loop
150 INPUT#1,A(N)     'Input variable
160 NEXT N
170 CLOSE 1          'Close file
54
```

Thinking time again. Write code to write 20 names and addresses onto a disk file called NAD.DAT.

```
430 OPEN "O",1,"NAD.DAT"
440 FOR N=1 TO 20
450 PRINT#1,N$(N);",";A1$(N);",";
    A2$(N);",";PC$(N)
460 NEXT N
470 CLOSE 1
```

Now write code to read them off again.

```
720 OPEN "I",1,"NAD.DAT"
730 FOR N=1 TO 20
740 INPUT#1,N$(N);",";A1$(N);",";
    A2$(N);",";PC$(N)
750 NEXT N
760 CLOSE 1
```

An answer is given at the end of the article, but the ultimate test is, of course, whether your computer will do it.

Now, To End The File

The examples tackled above work fine as long as you know in advance how many records you will be reading. But what happens if you don't know how long a file is, but just keep looping around, reading it? The answer is that as soon as you've read the last item of data in a file, the next time you try to read from it you will get an error message, and your program will stop. Not good.

BASIC gets around this problem by providing a flag called EOF, which stands for End Of File. This is automatically set to true when you read the last data item in a file. Now we can include a test for the EOF flag in our read loop, and everything will be fine:

```
370 OPEN "I",1,"NAD.DAT"
380 N=1
390 IF EOF(1) THEN 440
400 INPUT#1, N$(N),A1$(N),A2$(N),PC$(N)
410 N=N+1
420 GOTO 390
430 REM CONTINUE PROCESSING
440 CLOSE 1
```

If we were inputting from file 2, then we would test for EOF(2). For file 5 it would be EOF(5), and so on.

The Mailing List Program

With all this in mind, it is now time for us to complete our mailing list program. In particular, we will need to add several functions to our basic sort utility. We have to be able to:

1. Add names to the file.
2. Delete names from the file.
3. Sort the file into either alphabetic order or postcode order.
4. List the file to the screen.
5. Print labels from the file.

Additional functions might be used to

specify the name of the file we are working on and to exit back to the operating system. In particular, I have applied one restriction to this program to make it more useful in the 'commercial' environment. It is to be compatible with MicroPro's MailMerge utility, part of the WordStar word processing package.

We'll start with the overall system design, using a technique known as **flowcharting**. The chart shows the overall operation of the program and relates the various routines. The routines each perform one of the basic functions referred to above. Each is a separate functional block in the main program.

The program starts, as usual, with its name and historical information, followed by the declarations which reserve string space and dimension the arrays.

```
100 REM    *** SEQUENTIAL FILE
           MAILING LIST MANAGER ***
110 REM    *** COMPATIBLE WITH
           MICROPRO MAILMERGE ***
120 REM    WRITTEN IN MBASIC 4.4
130 REM    1/12/81
140 :
150 CLEAR 10000
160 DIM IAZ(100), N$(100), C$(100),
    A1$(100), A2$(100), PC$(100)
```

This is all pretty straightforward; there's nothing new for us here. Next, we start the program by printing its name on the screen and asking for the name of the file to work on.

```
170 PRINT CHR$(12);TAB(22);"MAILING LIST"
    : PRINT: PRINT
180 PRINT: INPUT "FILE TO WORK ON";F$
190 :
```

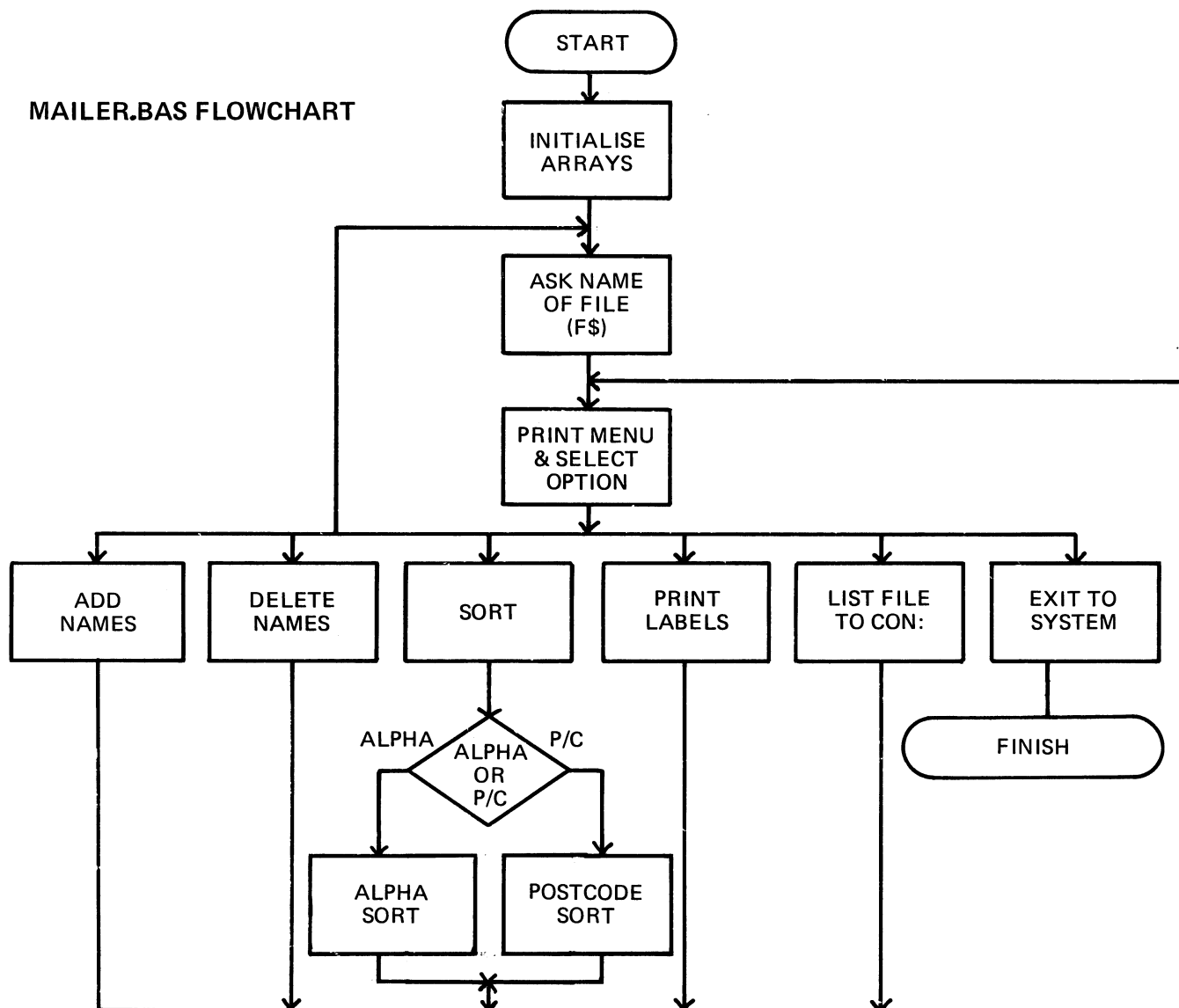
None of this is very startling, either. CHR\$(12) is the character that clears the screen on my terminal. TRS-80 owners will want to replace the CHR\$(12) with CLS.

Could We See The Menu?

Having cleared the screen and input the name of the file we're going to work on, we are now ready to offer the user a choice of things to do. We'll do this by presenting a **menu** of options. Here is the code:

```
200 REM    *** DISPLAY MENU ***
210 :
220 PRINT CHR$(12);"1 - Add Names"
230 PRINT "2 - Delete Names"
240 PRINT "3 - Sort File"
250 PRINT "4 - List File to CON:"
260 PRINT "5 - Print Labels"
270 PRINT "6 - Change Work File"
280 PRINT "7 - Quit and Return to CP/M"
290 PRINT: INPUT "Enter Choice";C
300 IF C<1 OR C>7 THEN 220
```


MAILER.BAS FLOWCHART



```

310 ON C GOTO 380,1060,490,1740,
    1480,170,340
320 :

```

Again, the screen is cleared, then a list of seven options is displayed. Line 300 re-presents the list if the user types in an answer outside the expected range. Line 310 is our first use of the ON...GOTO statement. This uses the value in the specified variable (in this case C) to select one arm of a multi-way branch. If C is 1, control is passed to the first line number of the list, if it is 2 we jump to the second, and so on.

The easiest subroutine is going to be number 7. Here it is:

```

330 REM EXIT MBASIC
340 SYSTEM
350 :

```

TRS-80 owners would probably replace the SYSTEM statement with END.

The next subroutine to be tackled is the one that adds names and addresses to the file.

Remember our earlier discussion of how it is impossible to read and write from the same sequential file. In this case, I have chosen to keep the original file but rename it from 'filename.DAT' to 'filename.BAK'. This way, the user can recover from any serious errors by simply erasing the new version of the file and renaming the .BAK version to the correct name.

Here is the routine:

```

360 REM **ROUTINE TO ADD NAMES TO FILE**
370 :
380 PRINT CHR$(12); "Add Names to File ";
    F$: FOR N=1 TO 300: NEXT N
390 IZ=1:GOSUB 1250:IZ=IZ-1:GOSUB 1360
400 IF EOF(1) THEN 440
410 INPUT #1,N$,C$,A1$,A2$,PC

```

```

420 PRINT #2,N$,"";C$,"";A1$,"";
    A2$,"";PC
430 GOTO 400
440 FOR NZ=1 TO IZ
450 PRINT #2,N$(NZ);",";C$(NZ);",";
    A1$(NZ);",";A2$(NZ);",";PC$(NZ)
460 NEXT NZ
470 CLOSE 1,2:GOTO 220
480 :

```

You will notice this routine uses two subroutines. Here is the first of these:

```

1230 REM *** SUBROUTINE TO BUILD ARRAY
    OF NAMES AND ADDRESSES ***
1240 :
1250 N$(IZ)="" :PRINT CHR$(12):PRINT:
    PRINT: INPUT "Name      ":";N$(IZ)
1260 IF N$(IZ) = "" THEN RETURN
1270 INPUT "First name:";C$(IZ)
1280 INPUT "Addr1      ":";A1$(IZ)

```

```

1290 INPUT "Addr2      :";A2$(I%)
1300 INPUT "Postcode  :";PCZ(I%)
1310 I% = I% + 1
1320 GOTO 1250
1330 :

```

I% is set by the calling program to be 1. This subroutine simply loops around, inputting a surname, given name, address lines and postcode. Whenever no name is input, it returns to the calling program.

Here is the subroutine which renames the original file to .BAK and opens the files:

```

1340 REM *** SUBROUTINE TO RENAME AND
      CREATE BACKUP FILE ***
1350 :
1360 R$=LEFT$(F$,LEN(F$)-3)+".BAK"
1370 ON ERROR GOTO 1430
1380 KILL R$
1390 NAME F$ AS R$
1400 OPEN "I",1,R$
1410 OPEN "O",2,F$
1420 RETURN
1430 IF ERR = 53 THEN RESUME NEXT
1440 PRINT "Strange Error in ";ERL:STOP
1450 :

```

Line 1360 uses the LEFT\$ function to 'grab' all but the right-most three characters of F\$ (the filename) and then sticks .BAK on the end. In line 1380 there is a possibility of an error occurring: it doesn't really bother us if there isn't an existing '.BAK' file, as we are going to KILL (or erase) it anyway.

Nonetheless, MBASIC will report a 'File Does Not Exist' error and drop us out of our program. We get around this by line 1370, which directs MBASIC to jump to line 1430 if it finds an error.

Once there, if the error is coded number 53 ('File Does Not Exist'), then we just ignore it and resume execution with the next statement (that is, line 1390). Otherwise, we print an error message, including the line where the error was found.

Normal execution opens the two files in exactly the way we've learned.

Arrays Are The Key

Now the operation of the main 'Add Names' routine will become a little clearer. It works by building up an array of names and addresses in memory. This is done by the first subroutine. Once that is complete, it renames the input and output files and opens them. It then copies the input file across to the output file and outputs the contents of the array on to the end. Finally, both files are closed. It's that simple.

Next, we'll tackle the sort routines. First, we print a little menu to let the user decide which sort of sort he/she wants:

56

```

490 REM      *** SORT SUB-SYSTEM ***
500 :
510 PRINT CHR$(12);"Sort Sub-system"
520 PRINT:PRINT:PRINT "1 - Sort on Name"
530 PRINT "2 - Sort on Postcode"
540 PRINT:INPUT "Enter Choice";C

```

Having decided that, we then read in the file:

```

550 GOSUB 1360
560 NZ=1
570 IF EOF(1) THEN CLOSE 1: GOTO 620
580 IAZ(NZ)=NZ
590 INPUT #1, N$(NZ),C$(NZ),A1$(NZ),
      A2$(NZ),PCZ(NZ)
600 NZ=NZ+1
610 GOTO 570
620 NZ = NZ - 1: PRINT: PRINT: PRINT
      NZ;"Records Read": PRINT

```

Now the file is in memory, we jump to the appropriate sort routine:

```

630 ON C GOTO 670,910 'DECIDE WHICH
                        SORT TO USE

```

640 :

Here is the sort on surname:

```

650 REM      *** SHELL SORT ON NAME ***
660 :
670 FOR IZ=1 TO NZ STEP IZ
680   MZ = 2 * IZ - 1
690   NEXT IZ
700   KZ = NZ - MZ
710   FOR JZ = 1 TO KZ
720     FOR IZ = JZ TO 1 STEP -MZ
730       IF N$(IAZ(IZ)) > N$(IAZ(IZ+1))
          THEN SWAP IAZ(IZ),IAZ(IZ+1)
740     NEXT IZ
750   NEXT JZ
760   MZ = MZ / 2
770   IF MZ <> 0 THEN 700
780 :

```

As you can see, this is exactly the same sort routine we used before. And having completed the sort, we write the file back to the output file:

```

790 REM      *** WRITE OUTPUT FILE ***
800 :
810 FOR IZ=1 TO NZ
820   PRINT #2, N$(IAZ(IZ));";";
830   PRINT #2, C$(IAZ(IZ));";";
840   PRINT #2, A1$(IAZ(IZ));";";
850   PRINT #2, A2$(IAZ(IZ));";";
      PCZ(IAZ(IZ))
860 NEXT IZ
870 PRINT IZ-1;"Records Written":
      CLOSE 2:GOTO 220
880 :

```

This is very straightforward. For those

who appreciate small subtle differences, here's the postcode sort:

```

890 REM      *** SHELL SORT ON POSTCODE ***
900 :
910 FOR IZ=1 TO NZ STEP IZ
920   MZ = 2 * IZ - 1
930   NEXT IZ
940   KZ = NZ - MZ
950   FOR JZ = 1 TO KZ
960     FOR IZ = JZ TO 1 STEP -MZ
970       IF PCZ(IAZ(IZ)) > PCZ(IAZ(IZ+1))
          THEN SWAP IAZ(IZ),IAZ(IZ+1)
980     NEXT IZ
990   NEXT JZ
1000  MZ = MZ / 2
1010  IF MZ <> 0 THEN 940
1020  GOTO 810
1030 :

```

As you see, the two sorts are remarkably similar.

The next routine to be tackled is the one which deletes names from the file. The approach I have chosen here is to minimise file accessing by deleting up to a hundred names in one go. Here's the routine:

```

1040 REM *** ROUTINE TO ERASE NAMES ***
1050 :
1060 PRINT CHR$(12):PRINT TAB(24);
      "Delete Names":FOR N = 1 TO 300:NEXT N
1070 PRINT CHR$(12)
1080 IZ=1:GOSUB 1250:IZ=IZ-1:GOSUB 1360
1090 IF EOF(1) THEN 1160
1100 INPUT#1,N$,C$,A1$,A2$,PCZ
1110 FOR NZ= 1 TO IZ
1120   IF N$(NZ) = N$ AND PCZ(NZ) = PCZ
      THEN 1180
1130 NEXT NZ
1140 PRINT #2,N$;";";C$;";";A1$;";";
      A2$;";";PCZ
1150 GOTO 1090
1160 CLOSE 1,2
1170 GOTO 220
1180 PRINT CHR$(12);"Match found:":PRINT
1190 PRINT N$:PRINT C$:PRINT A1$:
      PRINT A2$;";";PCZ:PRINT
1200 INPUT "Delete (Y/N)";A$:IF LEFT$(A$,1)
      = "Y" OR LEFT$(A$,1)="y" THEN 1090
1210 GOTO 1130
1220 :

```

The routine starts off the same way as the 'Add Names' routine, by building an array of names and addresses and opening the input and output files. Then the two diverge.

Finding A Match

As each record is input from the input file (line 1100), it is compared with each

Continued on Page 67

VIC from VIC PARK COMPUTER CENTRE

VIC 20

- Colour modulator included giving 8 colours.
- Plugs into domestic TV.
- 3½k user ram.
- Uses Pet Basic.
- Complete with power supply, ready to work.
- VIC Cassette unit with counter is needed to transfer information onto tape.
- A host of low cost extras!



Vic Cassette

EX STOCK

VIC-LIGHT PEN

This high quality light pen works in both normal and Hi-Res modes on the Vic allowing simple interaction with the Vic without keyboard entry.

Easy to program and easy to use. e.g. Menu Selection, Non-keyboard entry, Teaching Games.

FEATURE

Touch sensitive "Enter" contracts to eliminate accidental entry.

VIC-RS232 INTERFACE

Fully implemented

(true levels)

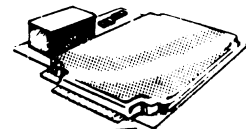
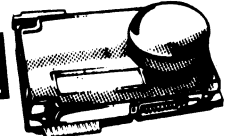
RS232C-V24

BI-DIRECTIONAL INTERFACE

Allows Vic to work as Mainframe Terminal, Drive a Qume Daisywheel or a Paper Tape Punch etc.

FEATURE

The RS232, fully-implemented interface that we offer contains a master power unit which can double Vics ability to support add-ons and has an external socket to allow the supply voltages plus 5V, plus 15V-15V to be used for other devices, memory expansions, cassette drives, light pens, printers etc.



VIC-MEMORY 19k

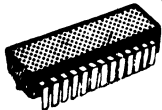
This memory expansion allows the user a large programming memory, 16k of which is battery protected so that programmes may be kept in memory for up to 1 year even when the Vic is unplugged. A 4k removable module is incorporated which has its own battery back-up circuit.

Switches allow the memory to be configured at various locations thus making use of VICs auto-start ability.

FEATURE

The 4k removable module will plug directly into the spare ROM sockets on PET and can be programmed or read on both PET & VIC.

NOW AVAILABLE



VIC-MEMORY 3k

Small size-

Low cost

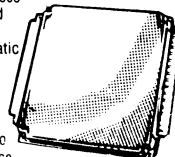
memory expansion.

Plugs into Vic and reproduces memory-port. Can be used with other expansions.

Gives a total of 6k user static ram on Vic.

FEATURE

This board allows Vic to move and enables the use of HIGH RESOLUTION COLOUR GRAPHICS.



LOW COST

VIC-TOOL KIT

For those who know toolkit on Pet we now have the same facilities for VIC.

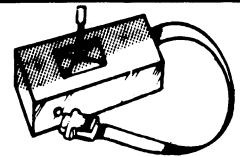
Renumber, auto etc.

This may be used with the Stack VIC Rom Switch Board.



VIC JOYSTICK

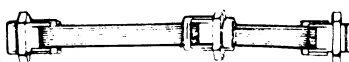
Hand-held joystick units for games use available in Pair or Single configuration.



STOP PRESS! THE VIC 20 PRINTER NOW IN STOCK.

VIC-Games port adaptor cable

LOW COST

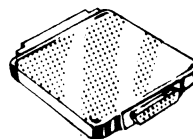


A two into one adaptor for use with both joysticks and light pens. A must for those who require full control of games with graphics.

FEATURE Low-cost, high-quality-Robust-Stackable.

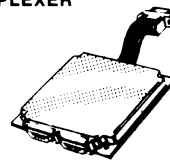
ULTRA LOW COST BIDIRECTIONAL RS232 INTERFACE

This unit whilst very low cost does not cut corners in performance but uses true positive and negative data states. The interface is configured as a conventional pin-out to a 25 way 'D'-type connector.



GAMES PORT MULTIPLEXER

This device connects to the games port of the Vic and multiplexes pot x and pot y lines under software control enabling pairs of analogue joysticks to be used for sophisticated multiplayer games.

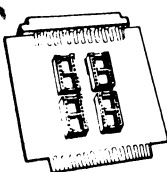


VIC Rom Switch Board

An inexpensive unit which plugs direct onto Memory Expansion Port of the VIC and allows the insertion of up to 4 ROMs for games packs or toolkit aids etc.

Feature Simple software switch exchanges each pair of ROMs into VICS Rom Space allowing 'clashing' Roms to be used.

Feature Plug in Zero Force sockets are available as optional extras to help eliminate pin damage to valuable ROMs.



VIC ACCESSORIES

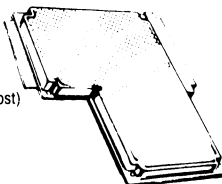
1. Audio/video/TV port plug.
2. Audio/video/TV port socket.
3. Audio/video/TV port splitter lead (1 plug 2 sockets).
4. Printer/Disk Serial port plug.
5. Printer/Disk Serial port socket.
6. Printer/Disk Serial port splitter lead (1 plug 2 sockets).
7. Cassette port connector (socket).
8. User port connector (socket).
9. Hood for user port connector.
10. Memory expansion connector (socket).
11. User port splitter—A small board plugs into the VIC and has 2 user ports reproduced at rear/side.
12. Dust covers for VIC 20.
13. Dust covers for C2N Cassette.
14. C2N Cassette Decks.
15. Blank Cassettes.
16. Tape Head Demagnetisers.
17. Tape Head Cleaner.
18. Tape Storage Box.
19. VIC Printer Ribbons.
20. VIC Printer Paper (2000 sheets).

MEMORY EXPANSIONS

In addition to the units listed above we offer twelve more memory options. These are available in two device types: NMOS (for lower cost) and CMOS (For lower power drain).

Each type is offered in three memory sizes with or without an optional switchable 3K ram in the lower address space. i.e.

CMOS (low power)	NMOS (low cost)
8k	8k
8k plus 3k	8k plus 3k
16k	16k
16k plus 3k	16k plus 3k
24k	24k
24k plus 3k	24k plus 3k
1 RAM	



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So You Want To Write Instructional Programs?



Writing good instructional programs involves some complexities, writes DR JOHN F. BARRETT, a lecturer in the School of Education at Sydney's Macquarie University.

But having immersed yourself in the world of microcomputers and delved deep into the caves of computer games, you may be keen to try. So Dr Barrett has set out some of the principles and guidelines for writing your own educational software.

THE TASK of writing good instructional programs is both simple and complex.

It is simple in our goal of having someone learn something while at the computer keyboard being obvious. It is complex due to the need to know a great deal about the psychological processes of learning, and also know how to write programs which follow established learning principles.

I know full well that various learning theorists would be critical of the simplicity of the presentation, but to begin, let me endorse the editorial of MICRO-80, issue No 3, of February 1980. (MICRO-80 is a magazine for Z80 users, edited by Ian Vagg of PO Box 213, Goodwood, South Australia 5034.)

Generally, "teaching programs should be interesting" as well as building the confidence and self-esteem of the user. Also mentioned in the MICRO-80 editorials, is the satisfactory treatment of user errors, which is a very important aspect of any form of instruction. This presentation will convey, I trust, the idea that the computer is capable of providing a more complex instructional role than simply telling how many questions you answer correctly from 10 attempts!

In this introduction to the field I have kept to principles derived from behavioural theory, particularly the work of B.F. Skinner, who has considerable experience and conducted extensive research in the area of behaviour modification from which many programmed learning materials and CAI (Computer-Assisted Instruction) packages have developed.

Learning Principles

Some principles of learning via computer are:

1. The goals or objectives of the program are clearly defined, and all experiences or steps in a program are designed to aid the learner in attaining these goals.
2. Material to be learned should be in small steps of a number of 'frames' of information.
3. Following each frame or step, a number

of questions which assess learning of the material should be presented.

4. Related to points 2 and 3 above, the learner should be actively involved in the learning experience.
5. Material should be presented at a level appropriate to the learner's ability, so the student can get about 70 percent of answers correct.
6. Responses (answers) should have 'differential treatment':
 - (a) Correct answers are acknowledged and reinforced (rewarded).
 - (b) Incorrect answers are treated in such a way that the learner is eventually able to get the correct response.
7. The learner has to get the correct response *before* proceeding to the next step.
8. Related to 4, 5, and 6 above, the user is provided with immediate knowledge of results. This is an important principle, most often ignored in classroom teaching and a major strength of CAI — when so designed!
9. 'Tests' for competency (knowledge or problem solving) may be used. Basically these take three forms:
 - (a) As a **pre-test**, before a new sequence of instruction to gauge the entry status of the learner. That is, does the learner have significant 'knowledge' to begin the program.
 - (b) As a **post-test**, for assessing performance levels after instruction that is, the usual 'test' procedures.

(c) For **diagnosis**, where errors are analysed *and* instruction is provided for remedial purposes. Please note that testing 'in and of itself' is not predominantly instructive. It may provide useful information which allows learning, but this has to be built into the learning system.

10. After the learner has attained the correct response and is rewarded (not every time!), then further **practice** is given. Such practice enables 'overlearning' the correct response.

However, the practice exercises are at a similar level of difficulty and only employ previously learnt material and skills. Contrast this with many lessons at school. After the teacher has shown the correct procedure on the chalk board (how actively involved is each pupil?), often demonstrating a number of complex steps, he now says: "Now do number three, five, seven and nine of the graded exercises!"

These exercises turn out to be performance tests not practice!

11. Continuous reinforcement (reward statements such as 'correct' or 'well done!') are effective only for a limited time in the initial phases of new instruction.

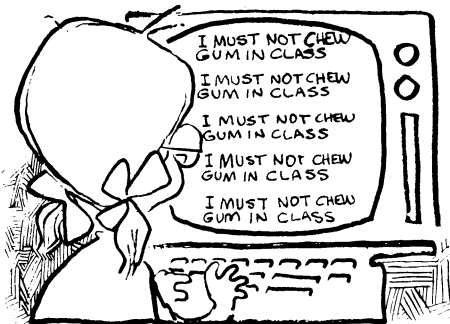
After this, a ratio of reinforcement (that is reward statements of one in say five correct answers) followed in a later phase by random reinforcement (where rewards are randomly distributed to correct answers) will prove to be more effective.

12. Enable the learner to move at his own **pace**. This has two aspects:

(a) Quickness of response — the computer is infinitely patient with slow 'responders', and can keep ahead of the best!

(b) Those doing well (you define this in your program) may 'jump' sections of the work to reach the goals of the program more quickly. In this case, you have changed from a linear program (like reading the pages of a book) to branching programs.

Obviously, it is imperative you know where such branching will finish up!



CAI Development Guidelines

How can we use these principles for the development of instructional programs? First, keep it simple!

Until you have a 'feel' for the process, it is better to select an area with which you are quite familiar. This is particularly important for the writer as you are trying to accomplish skill in three aspects:

- Remember the aim and objectives of your program — what exactly do you wish your learner to be able to do (or know) as a result of your program.
- Keep track of the flow of ideas and the sequence of the learning tasks (this applies especially to the treatment of incorrect answers).
- Have programming skills (and the appropriate hardware) to accomplish what you intend.

Programming and Flowcharting

Let's examine a block diagram of what a simple program may contain (see figure 1).

In this first stage an introduction must be given. Note, the instructional step should be kept short and written in an accurate and free-flowing style, using words appropriate to the reading level of users. Of course presentation on the screen as to tabulating and spacing is important, but these may be edited at a later date.

Answers are treated as correct or incorrect. Incorrect answers simply repeat the instruction/assessment loop (note the infinite loop — we'll have to do something about that!). A correct answer brings confirmation that the answer is correct, and it is rewarded in some way.

Rewards are of two types: one is intrinsic — just getting the correct answer is rewarding. This can be consolidated by giving a running total of correct answers.

Note, the learner is not chastised in any way. He is told, say, "No, let's try again!"

As you see this treatment has a built in fault. Our learner has now 'learned' the correct response possible without knowing why it is so!

ASPECTS OF SIMPLE CAI PROGRAM

INSTRUCTIONAL ASPECT

INTRODUCTION OBJECTIVES

INSTRUCTION (STIMULUS)

ASSESSMENT

RESPONSE

KNOWLEDGE OF RESULTS

REINFORCEMENT

NEXT STEPS

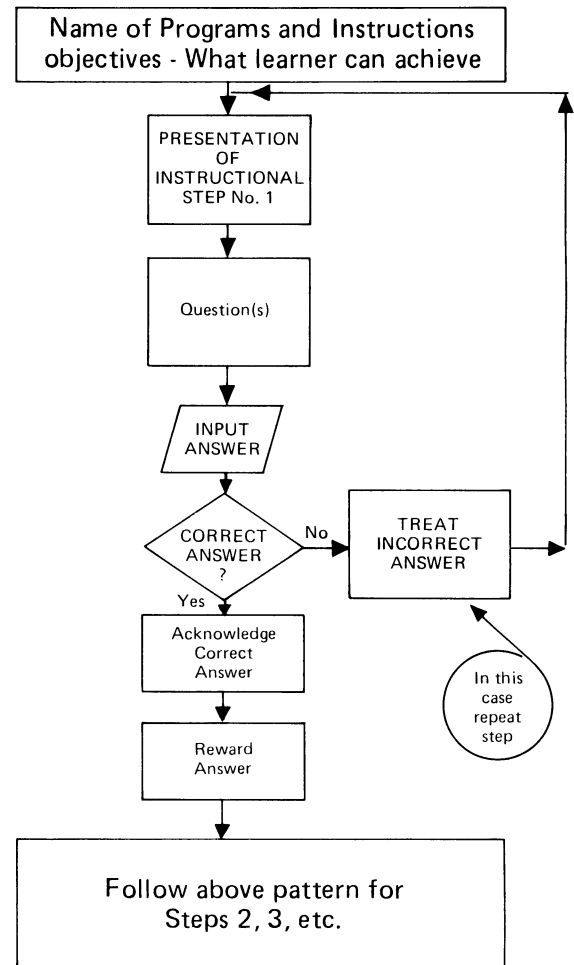


FIG 1

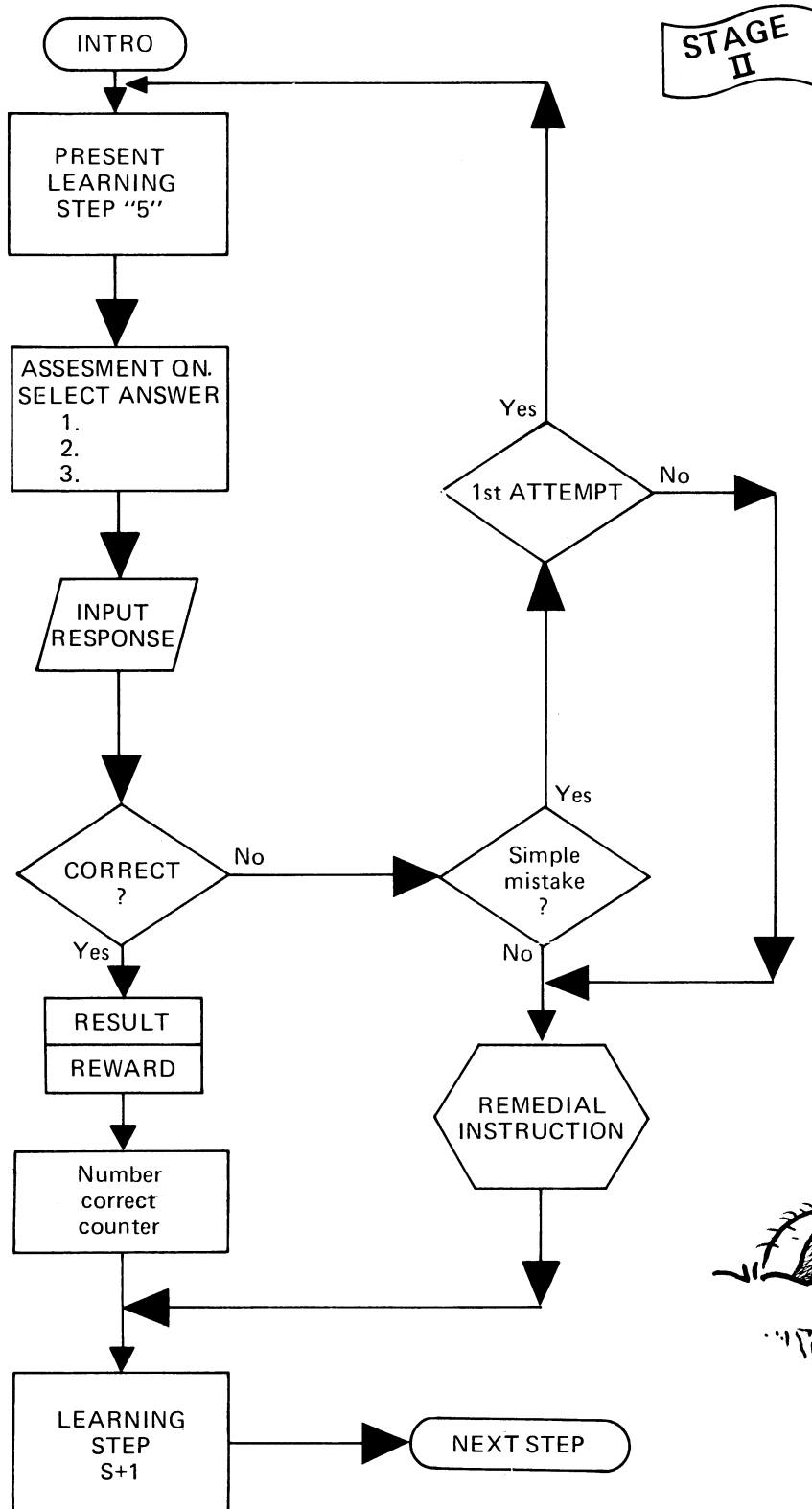


FIG 2

If you continue to develop your program following this sequence, you will have the framework of a good *linear* program. Even though it is a very simple structure you have the basis for building a more complex program — one more suited to computer applications.

Second Stage

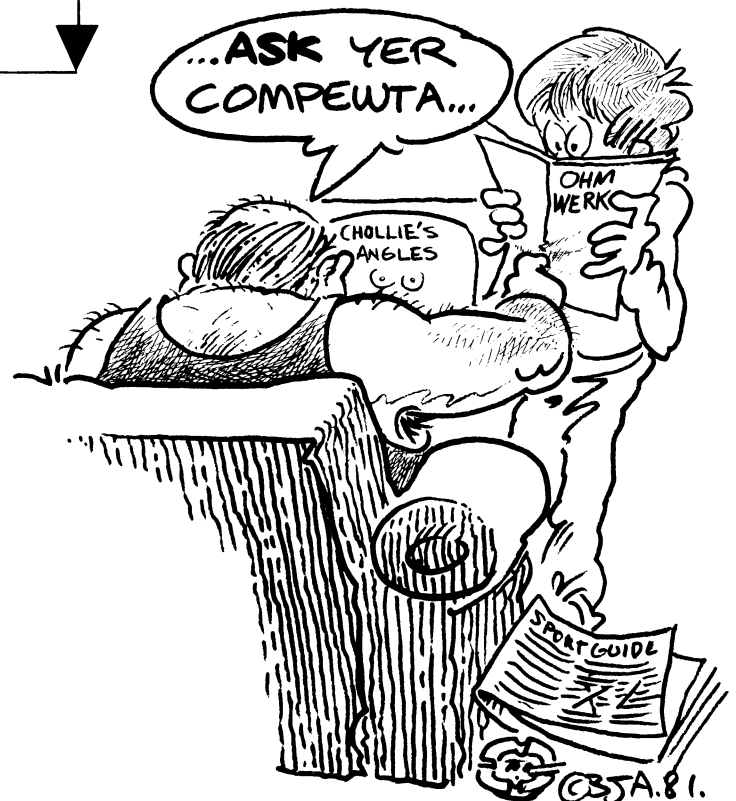
You may use refinements, such as those suggested in figure 2, to further incorporate some of the previous mentioned principles.

In the explanation stage, a frame is presented and three possible answers are presented. The correct answer followed the previous example, but in this case a 'number-correct' counter is initiated.

Incorrect answers are treated differentially. A simple mistake gains a second attempt. However, we have removed the infinite loop by allowing a second attempt only. Third attempts and 'serious mistakes' are given remedial instruction. That is, they are shown how the mistake may have occurred, and how it can be corrected.

The remedial instruction block is shown as a sub-routine. They may well be referred to later, as part of the program where similar mistakes are made. Also, consider the idea of storing these for remedial work as a result of performance on a final TEST (that is the 'post-test')

In this case, after remedial instruction the learner goes to step two. It is obvious that after such remedial instruction, the



learner could have been re-routed to step one. Again the loop would have to be considered.

Further Refinements

The block diagram (figure 3) suggests further development.

After the learning frame, an assessment question in the form of a five answer multiple-choice is presented. Each answer is treated differently. The learner who gets this correct (Correct B) and has all steps correct so far (or whatever you define) can jump a number of steps to the next concept. 'Correct A' may be given more practice to consolidate previous learning.

For the incorrect, three treatments are applied. Demonstrating a serious misconception 'Incorrect Z' sends to learner a remedial sub-routine (after that it's up to your programming!). 'Incorrect X' has missed the main idea or concept and goes back a few steps, while 'Incorrect Y' made a 'silly mistake' and repeats the question.

This procedure should trigger a large number of possibilities. It will be important to keep track of where all possibilities lead (especially 'infinite loops'), and keep in mind the instructional purpose of the program.

Content of Steps

In this presentation I have concentrated on simple CAI (Computer Assisted Instruction). Note that these are not games or simulations (more on these aspects later!).

Each step or frame referred to above can contain various types of information. It is probably best to concentrate on teaching knowledge or facts in your first attempt at programming CAI. However, do not present long pages of material in which the learner only pushes a button for each page (books can do the same thing!).

Each step should encourage:

- knowledge of facts.

- knowledge of ideas.
- Recall of facts, ideas (remembered from previous materials).
- Recognition — visual prompt to encourage response.
- discriminations — being able to tell difference between A and B, or ABC etc.
- knowledge of concepts and principles.
- methods of solving problems.

The procedures outlined in this article are probably more suited to the first five aspects listed in here. The other two areas require a different approach and perhaps another article! □

Education Software Applications

WHAT KINDS of situations are suited to the use of instructional software?

In industry and commerce, situations where repeated instructions are to be given at different periods of time (such as a 'sales' introductory program) could be written for the orientation of new staff members of a retail store. Similarly, microcomputers could have a variety of applications for teaching in industrial training settings.

In the home, there are applications not only for an individual's study of disciplines such as mathematics or geography, but also for learning or consolidating what has been covered at school. For example, a student could write a program to plot sine, cosine and sine plus cosine curves of various dimensions, and so gain a great deal of understanding of the graphical representation and the effects of changing values in mathematical formulae.

One can also imagine a number of applications where instructions around the home could be placed on computer. For example, all the information of how to maintain the home pool could be programmed to provide a neat little instructional sequence. Try your hand at writing out all the pool cleaning instructions (backwashing, etc) in logical order in a way that will ensure a person knows correct procedure when you are not there. You will soon get anxious about what could happen if a valve is inadvertently left closed!

also, parents and older children could write some instructional program for tutoring children in units of school work where they have some difficulty.

School applications are obvious not only for full lessons, but for support as part of a lesson. Students could be encouraged to write a unit of work (even if the programming was done by someone else) and merge these into a larger instructional sequence. □

REFINEMENTS

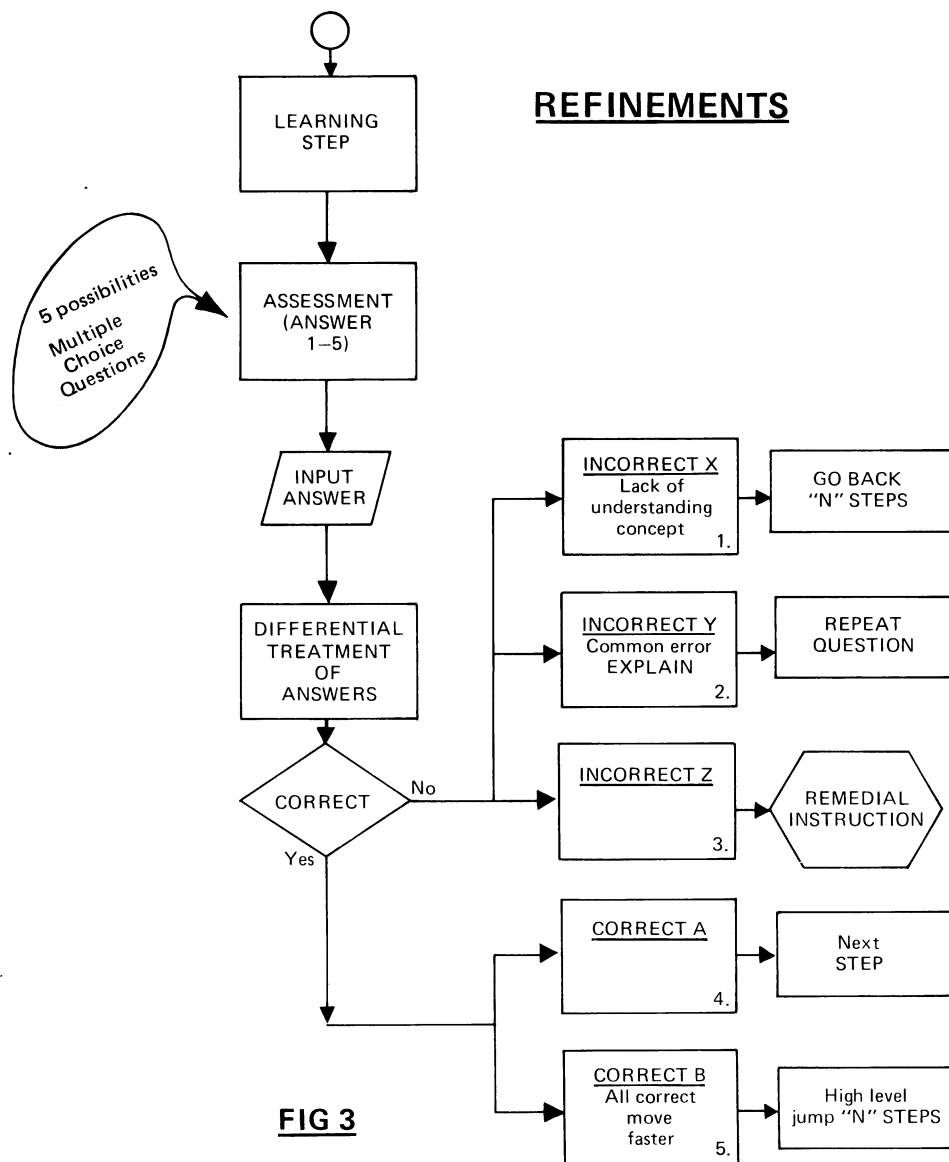


FIG 3

A few months ago we reviewed Sharp's PC-1211 pocket computer. Not long after we received a call from Sharp, who had a new machine and wanted to know if we would like to take a look at it? When we saw it, we knew you'd want to know about. . .

POCKET POWER!

THE PC-1211 has been around for about 18 months, both under its own name and as the TRS-80 Pocket Computer. In the meantime Sharp's designers have not been idle, as we discovered when we saw its new successor, the PC-1500.

The PC-1500 is slightly larger than its predecessor and considerably thicker. The keyboard has much better spacing. We found we could actually touch-type on the new machine. The display has both upper and lower case — another major improvement over the old machine — as well as an extra two characters width.

Under the cover there have been major changes too. More memory for a start; 1850 program steps, against the 1211's 1424. Another 4 Kbytes of memory can be plugged into the back of the machine, trebling its capacity.

ROM has been increased from 12 Kbytes to 16 Kbytes, allowing the addition of a number of features to BASIC. Two-dimensional arrays can now be dimensioned up to 256 by 256. Arrays of strings are now supported. Cursor positioning is now possible, which brings us to the most interesting feature of the display — its graphics capabilities.

The display is actually a seven by 156 array of dots, and the user can define any column giving a graphics capability. But more on graphics later...

Other BASIC expansions include a

your computer REVIEW

real-time clock, which can display the date and time, hexadecimal and boolean functions and a beep command, which allows the user to set the pitch and duration. A major improvement is the ability to nest FOR loops and subroutines to depths of 17 and 34 respectively, compared with only four on the PC-1211.

The PC-1500 can also be locked into a particular mode, to avoid operator foul-ups (which as any experienced user will tell you are the major source of errors).

Ten Times Faster

Perhaps the major improvement over the PC-1211 is in speed. The PC-1500 is almost 10 times faster than its predecessor.

The PC-1500 has a rather larger end connector than the PC-1211. The reason is many more signals are made available to peripherals. The major add-on for the

PC-1500 is its companion cassette interface and four colour printer/plotter (yes, Virginia, you read that correctly). This allows program and data listings to be generated.

The printer is not the conventional dot-matrix type. Instead, by moving the print stylus from side to side and the paper up and down, it literally writes the characters onto the paper. What's more, it will print in nine different character sizes, horizontally, upside-down and vertically.

There are four styli on the print head, which can rotate them like a modern-day four-shooter to print in red, green, blue or black. And all this is smaller than a mechanical adding machine. We're not often struck speechless, but this really stopped us in our tracks!

In addition, the printer can plot eight styles of dotted lines and probably has a few other tricks up its sleeve.

Pricing hadn't been set when we saw the machine, but you should be able to buy the computer and printer/plotter for around or even under \$500. As some of our American friends would say, this represents more bangs per buck than anything else on the market.

What will they think of next? □



UNDERSTANDING ASSEMBLER PART I

If you've mastered BASIC and feel you're ready for something with a bit more power, why not tackle assembly language? It's probably easier than you think, and LES BELL says it's capable of doing an awful lot.

BASIC is fine for a lot of jobs, but there are a lot of things it simply can't do — like high-speed bit fiddling, or input-output. That's why disk operating systems, BASIC interpreters and similar complex pieces of software are written in assembly language, not BASIC. And if you ever want to fix bugs in your operating system, or patch the input/output drivers, a knowledge of assembly language is indispensable.

What is assembly language? To understand that, it is necessary to start one level down, with an understanding of the microprocessor chip itself. In this series of articles, we'll learn to program the Z-80 microprocessor, the chip used in the TRS-80, System 80, ZX-81 and other popular microcomputers.

In fact, the Z-80 chip was a descendant from an earlier device, the Intel 8080. The Z-80 took the basic design of the 8080 and added extra registers and instructions, so it is still capable of running programs written for the 8080.

There are still a lot of 8080s around (I'm using one right now), and for this reason, we are going to deal with the 8080 subset of the Z-80. Besides, many readers will be using the CP/M operating system, which is supplied with an 8080 assembler and debugger as standard and which does not take advantage of the added facilities of the Z-80.

Scalpel, Please

Since we're going to be dealing with the actual bits and bytes of the computer, we'd better understand what a computer is, rather than what it does. Figure one shows the organisation of a typical microcomputer.

All the elements of the computer are linked together by a set of signal lines

your computer



called a **bus**. This carries power to the various parts so they can work, and it carries a clock signal, which is the computer's 'heartbeat'.

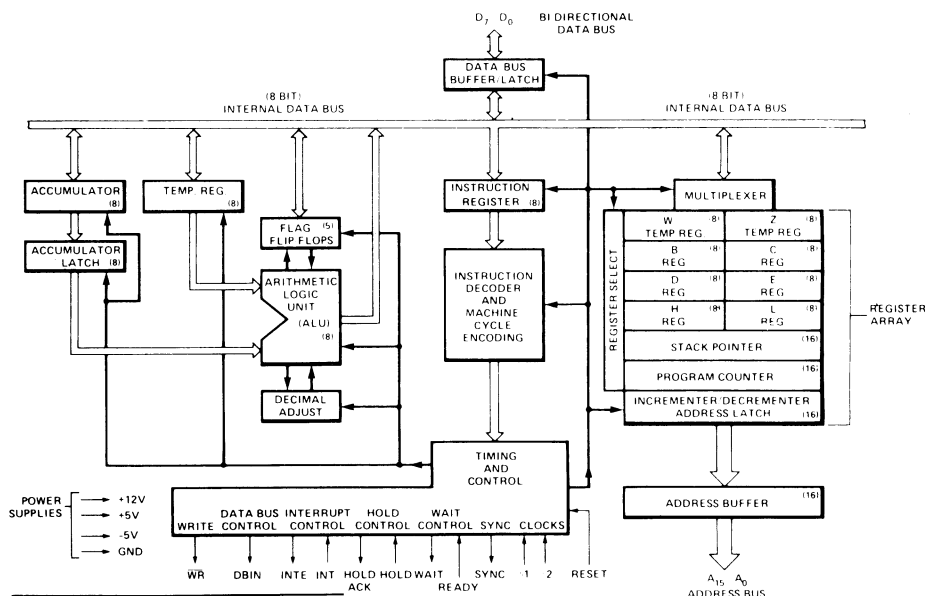
What is a microprocessor?

Leaving the electrical characteristics of the chip aside (we'll hardly refer to the electronic aspects at all), the chip is basically a set of registers which can store binary numbers, an arithmetic/logic unit which can process those numbers, and an instruction decoder which can analyse the program and get the various parts of the chip working together.

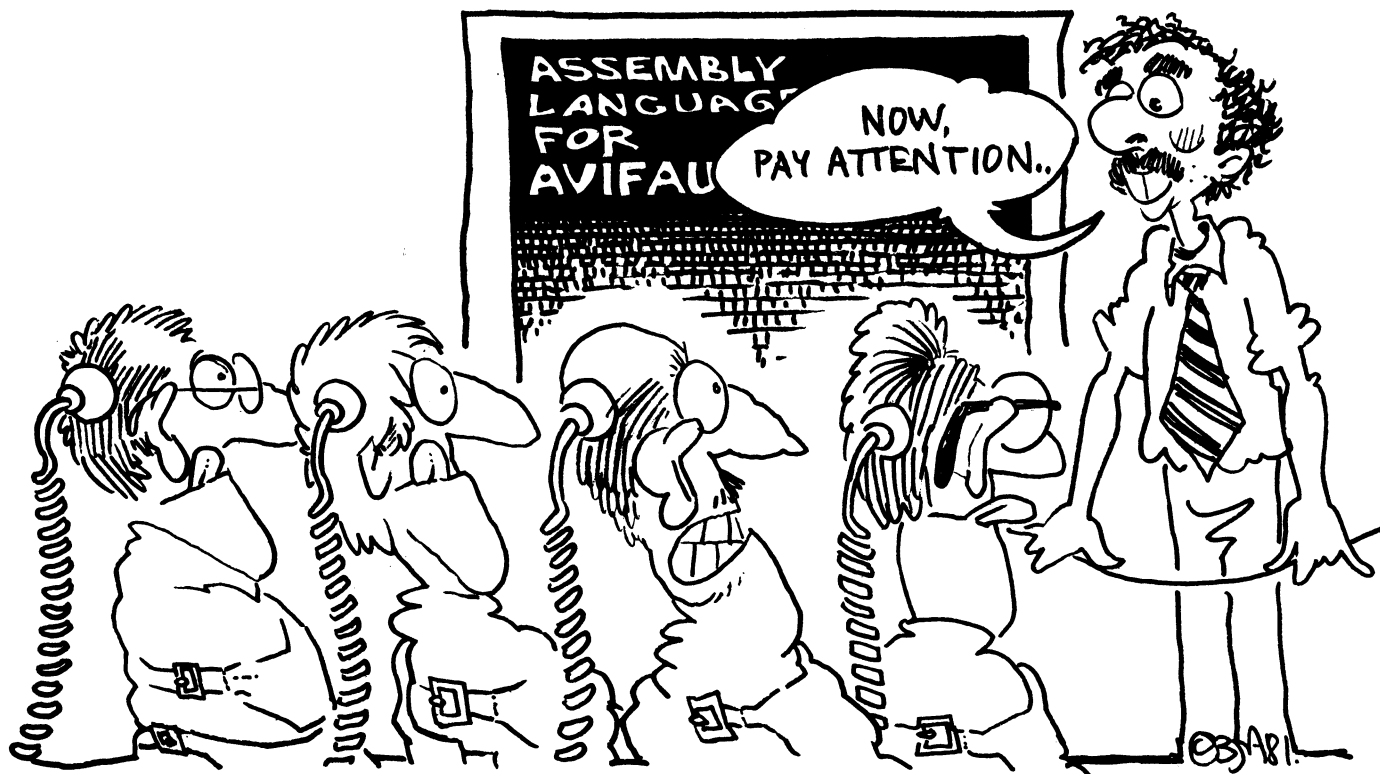
Figure one shows the various parts of the chip. At the left, you'll see the accumulator. This is a special register which works closely with the arithmetic/logic unit (ALU). You'll also see an accumulator latch and temporary register. Ignore these, as they're only used by the processor internally, and you can't get at them to do anything.

Attached to the ALU are five flag flip-flops. A flip-flop is a single memory cell which flips (or flops) from 0 to 1 and back again, depending upon certain conditions in the ALU logic to which it is attached. The flags tell us certain facts about the result of the last calculation performed by the ALU: whether the result is zero, negative or whether the calculation generated a carry and other useful info. Also attached to the ALU is a block of circuitry marked decimal adjust. We'll cover that when we do arithmetic.

On the right you'll see the register array, containing a number of 8-bit and 16-bit registers. The W and L registers are used internally, and we can't get at them. Registers B, C, D, E, H and L are 8-bit general purpose registers which can be operated on by a number of instructions. They can also be paired up to make the BC, DE and HL 16-bit register pairs, and



8080 CPU Functional Block Diagram



there are special 16-bit instructions which operate on them.

The stack pointer is a special purpose 16-bit register which is used in many different ways — we'll see most of these uses later. For now, it's enough to say the stack pointer is used by the processor to save temporary values.

Finally, the program counter is the 16-bit register which is used to fetch instructions from memory, sequentially. The remaining circuitry shown on the diagram can largely be relied upon to function automatically, without our having to worry about it.

Pulling it Together

How do all these registers and circuitry function together, and what do they do?

Let's examine how some of the simpler instructions work. We'll start by writing a simple program to add together two numbers which are stored in memory. This is done in the following way.

First, we load the first number into the accumulator (that's where all arithmetic is done) then add the second number to it. Finally we'll store the result back in memory. Here's the program:

```
LDA NUM1
MOV B,A
LDA NUM2
ADD B
STA ANS
```

Step by step, here's how this program works: At the beginning of the program, the program counter points to the first instruction (LDA — Load Accumulator). It fetches it into the instruction decoding circuitry, which recognises it and organises the internal circuitry of the CPU to carry out the instruction.

This involves fetching the next two bytes following the instruction. Together, these bytes form the address where the first number is to be found. That's right — NUM1 is *not* the first number, but the address where the first number is to be found.

Having fetched this address from the program, the processor then puts the address out again, this time on the address bus, activating that memory location so the processor can read its contents and move it into the accumulator.

That completes the first instruction.

Contents Retrieved

We now have retrieved the contents of NUM1 and placed them in the accumulator. The program counter is pointing at the next instruction, and we are ready to execute it. The procedure is exactly the same — we fetch the instruction, identify it, and then execute it. In this case the instruction is a MOVE, into register B, from register A.

The purpose is to temporarily save our first number while we load the second number into the accumulator. This is

necessary because the 8080 does not allow us to add a number directly from memory into the accumulator (with one exception, but later, later...). Nor does it allow us to move directly from memory into any register other than the accumulator (with one...).

So we have to load the second number into the accumulator, which means saving the first. Notice that the MOV instruction specifies the destination of the data first, then the source: MOV B,A means *into B from A*.

We can now use a LDA instruction again, this time to load the accumulator with the contents of location NUM2. We are now ready to perform the addition, which uses the ADD instruction to add the contents of B into the accumulator A.

We now have our answer, but it is in the accumulator. To store it back in memory, we use the STA (store accumulator) instruction to put it into the address specified. The processor executes this in just the same way as the LDA instruction — except when it puts out the address it writes into it instead of reading from it.

Language Characteristic

That's it. It seems like an awful lot of work, but that's characteristic of assembly language. Let's see how the program would be written for actual assembly and execution on a computer. Here's the full program:

```
;Program to add two bytes together
; 24/11/81
```

```
ORG 0100H

START: LDA NUM1 ;Get first val
      MOV B,A   ;Save it in B
      LDA NUM2  ;Get second
      ADD B     ;Add together
      STA ANS   ;Store result
```

```
;Data storage area
NUM1 DB 27
NUM2 DB 13
ANS DS 1
```

```
END
```

The lines beginning with semi-colons (;) are comment lines, the same as REMs in BASIC. They have no effect on the generated code.

Assembly language lines are split into sections called **fields**. The first field of each line is called the **label** field. If we want to refer to a particular address, we label it by putting a name into this field. Later (or earlier) in the program we can refer to such locations symbolically, with such statements as JMP START, or LDA NUM1.

The second field contains the mnemonic for the instruction, and the third field contains the data or address it operates on, often called the **operand**. The fourth field contains an optional comment.

As well as the instructions we wrote out previously, there are a few others in the program. The mnemonics for the instructions are sometimes called **op-codes**; they are the instructions the computer will follow.

The new op-codes aren't really op-codes at all, which is why they're called **pseudo-ops**. Instead they're there to give

the assembler program information it needs to assemble the program correctly.

For example, the ORG statement allows us to tell the assembler where in memory we would like this program located. It's short for ORiGin, and in this case says the program should start at location 0100H (the H stands for hexadecimal). I've chosen this address for compatibility with CP/M.

The Definitive Byte

Further down there are two DB statements. The DB (Define Byte) statement sets aside a single byte of storage, and initialises it to the value given in the DB statement. In this case, we've said NUM1 is a single byte of storage immediately following the program, and that it is to contain the value 27. NUM2 will immediately follow that, and will contain the value 13.

The next line contains a DS (Define Storage) pseudo-op. This is like the DB statement in that it sets aside memory for data storage, but it says nothing about what initial values these locations should have. Consequently, when the program starts running memory which has been reserved using a DS statement, it could contain anything. The DS 1 statement reserves one byte of storage; DS 32 would reserve 32 bytes, and so on.

I hope I don't have to explain what the END pseudo-op tells the assembler!

Now let's look at what the assembler outputs as a result of the assembly. There are two major files. One is called the **assembly listing** and contains our original input, with the machine code added into it. The other is called a **hex file** and contains the machine code alone, in a form suitable for machine loading. If our original file was called ADD.ASM, then running the assembler by typing ASM ADD will produce these two files, called ADD.PRN and ADD.HEX.

Here's ADD.PRN:

```
;PROGRAM TO ADD TWO BYTES TOGETHER
; 24/11/81

0100 ORG 0100H

0100 3A0B01 START: LDA NUM1 ;GET FIRST VALUE
0103 47 MOV B,A ;SAVE IT IN B
0104 3A0C01 LDA NUM2 ;GET SECOND
0107 80 ADD B ;ADD TOGETHER
010B 320D01 STA ANS ;STORE RESULT

;DATA STORAGE AREA
010B 1B NUM1 DB 27
010C 0D NUM2 DB 13
010D ANS DS 1

010E END
```



As you can see, it looks just like the original, with the addition of two more fields on the left (I don't know why on the left, right seems more logical to me too!). The leftmost field contains the address of the first byte of the instruction or data. The next field contains the generated code, in hexadecimal.

Looking at the PRN file, we can see NUM1 is located at 010B hex. If you look at the first instruction, you'll see it reads:

```
0100 3A0B01 START: LDA NUM1
;GET FIRST VALUE
```

The 0100 is the address of the first byte of the instruction, which is a 3AH. Then follows the generated code: 3A0B01. We found NUM1 at 010BH; why are the next two bytes 0B01? The answer is that the 8080, for reasons known only to itself, reverses the order of the bytes in a 16-bit word, putting the least significant byte first. So you'll soon get into the habit of mentally swapping the bytes in this part of the listing.

Incidentally, there's a pseudo-op for words, analogous to DB for bytes, which swaps the two halves of the word. So

```
DB 01FFH
```

would generate code of

```
XXXX FF01 DB 01FFH
```

automatically reversing the bytes.

Now here's the HEX file:

```
:0D0100003A0B01473A0C01B0320D011B0D36
:0000000000
```

Notice it's not actually machine code, merely a hex dump of the program, with some added information to assist in loading the program. The exact details of the hex file don't matter at this stage; there's a CP/M program called LOAD which turns this file into an executable program (that is, a .COM file).

Next month we'll delve into the complete 8080 instruction set, then we'll be ready to write complete and sensible programs. By the way, there's a deliberate error in the program above: can you see What it is? □

BASIC FOR BIRDWATCHERS

Continued from Page 56

name and postcode in the array (lines 1110-1130). If they match the program jumps to line 1180; otherwise the record is just written out to the output file. Finally, the files are closed and we are returned to the main menu.

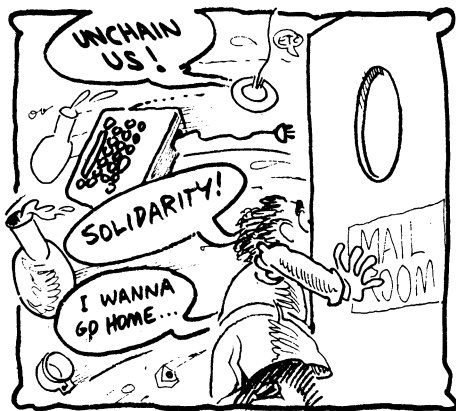
If a match is found, the record is printed (line 1190) and the user asked if the record is to be deleted. If it is, execution continues with the reading of the next record. If not, then it is output in the normal way.

The most important function of a mailing list program is to print labels which are then used to address envelopes. Here's the routine to do that:

```
1460 REM ** SUBROUTINE TO PRINT LABELS **
1470 :
1480 PRINT CHR$(12):PRINT:PRINT:
      PRINT TAB(30);"Now printing labels."
1490 OPEN "I",1,F$
1500 IF EOF(1) THEN 1520
1510 NZ=1:INPUT#1,N$(1),C$(1),A1$(1),
      A2$(1),PC$(1)
1520 IF EOF(1) THEN 1540
1530 NZ=2:INPUT#1,N$(2),C$(2),A1$(2),
      A2$(2),PC$(2)
1540 IF EOF(1) THEN 1560
1550 NZ=3:INPUT#1,N$(3),C$(3),A1$(3),
      A2$(3),PC$(3)
1560 LPRINT TAB(4);:FOR IZ=1 TO NZ
1570   LPRINT C$(IZ);
1580   IF C$(IZ)<>" " THEN PRINT " ";
1590   LPRINT N$(IZ);TAB(IZ*26+4);
1600 NEXT IZ:LPRINT
1610 LPRINT TAB(4);:FOR IZ=1 TO NZ
1620   LPRINT A1$(IZ);TAB(IZ*26+4);
1630 NEXT IZ:LPRINT
1640 LPRINT TAB(4);:FOR IZ=1 TO NZ
1650   LPRINT A2$(IZ);",";PC$(IZ);
      TAB(IZ*26+4);
1660 NEXT IZ:LPRINT:LPRINT:LPRINT
1670 IF EOF(1) THEN 1690
1680 GOTO 1500
1690 CLOSE 1:LPRINT CHR$(12)
1700 GOTO 220
1710 :
```

This job isn't as easy as it looks on first thought. The trick is to read in three records at a time, then print the three names across the page, followed by the three first address lines and so on. However, if the end of file is reached with only one or two records to be printed across the page, this complicates matters.

In this routine, I used N% to count the



number of records that are read in each 'pass' and this then controls the FOR..NEXT loops that print across the page.

Apart from that there's nothing complicated about this routine. It just needs slow, careful reading to make its operation evident. In line 1690, the CHR\$(12) is a form feed character, causing the printer to page eject.

Finally, a similar routine is needed to list the file to the console. In this routine I took a slightly different approach:

```
1720 REM ** SUBROUTINE TO LIST TO CON: **
1730 :
1740 PRINT CHR$(12):PRINT:PRINT:
      PRINT TAB(30);"File Listing:"
1750 WIDTH 80
1760 OPEN "I",1,F$
1770 IF EOF(1) THEN 1790
1780 NZ=1:INPUT#1,N$(1),C$(1),A1$(1),
      A2$(1),PC$(1)
1790 IF EOF(1) THEN N$(2)="" : C$(2)="" :
      A1$(2)="" : A2$(2)="" : PC$(2)=0:GOTO 1810
1800 NZ=2:INPUT#1,N$(2),C$(2),A1$(2),
      A2$(2),PC$(2)
1810 IF EOF(1) THEN N$(3)="" : C$(3)="" :
      A1$(3)="" : A2$(3)="" : PC$(3)=0:GOTO 1830
1820 NZ=3:INPUT#1,N$(3),C$(3),A1$(3),
      A2$(3),PC$(3)
1830 PRINT C$(1);
1840 IF C$(1)<>" " THEN PRINT " ";
1850 PRINT N$(1);TAB(26);C$(2);
1860 IF C$(2)<>" " THEN PRINT " ";
1870 PRINT N$(2);TAB(52);C$(3);
1880 IF C$(3)<>" " THEN PRINT " ";
1890 PRINT N$(3)
1900 PRINT A1$(1);TAB(26);A1$(2);
      TAB(52);A1$(3)
1910 PRINT A2$(1);",";PC$(1);TAB(26)
      ;A2$(2);
1920 PRINT ",";PC$(2);TAB(52);
      A2$(3);",";PC$(3)
1930 PRINT:PRINT
```

```
1940 IF EOF(1) THEN 1960
1950 GOTO 1770
1960 CLOSE 1:WIDTH 72:INPUT "Hit return
      to continue";A$
1970 GOTO 220
1980 END
```

This routine is considerably simpler than the label printer, and you should have no trouble following it.

Finally, to make it easier to key into your own computer, here is the complete program:

```
100 REM *** SEQUENTIAL FILE
      MAILING LIST MANAGER ***
110 REM *** COMPATIBLE WITH
      MICROPRO MAILMERGE ***
120 REM WRITTEN IN MBASIC 4.4
130 REM 1/12/81
140 :
150 CLEAR 10000
160 DIM IAZ(100), N$(100), C$(100),
      A1$(100), A2$(100), PC$(100)
170 PRINT CHR$(12);TAB(22);"MAILING
      LIST":PRINT
180 PRINT:PRINT:INPUT "FILE TO WORK
      ON";F$
190 :
200 REM *** DISPLAY MENU ***
210 :
220 PRINT CHR$(12);"1 - Add Names"
230 PRINT "2 - Delete Names"
240 PRINT "3 - Sort File"
250 PRINT "4 - List File to CON:"
260 PRINT "5 - Print Labels"
270 PRINT "6 - Change Work File"
280 PRINT "7 - Quit and Return to CP/M"
290 PRINT:INPUT "Enter Choice";C
300 IF C<1 OR C>7 THEN 220
310 ON C GOTO 380,1060,490,1740,1480,
      170,340
320 :
330 REM EXIT MBASIC
340 SYSTEM
350 :
360 REM ** ROUTINE TO ADD NAMES TO FILE **
370 :
380 PRINT CHR$(12);"Add Names to
      File ";F$:FOR N=1 TO 300:NEXT N
390 IZ=1:GOSUB 1250:IZ=IZ-1:GOSUB 1360
400 IF EOF(1) THEN 440
410 INPUT #1,N$,C$,A1$,A2$,PC
420 PRINT #2,N$;",";C$;",";A1$;",";
      A2$;",";PC
430 GOTO 400
440 FOR NZ=1 TO IZ
450 PRINT #2,N$(NZ);",";C$(NZ);",";
      A1$(NZ);",";A2$(NZ);",";PC$(NZ)
460 NEXT NZ
```

```

470 CLOSE 1,2:GOTO 220
480 :
490 REM      *** SORT SUB-SYSTEM ***
500 :
510 PRINT CHR$(12);"Sort Sub-system"
520 PRINT:PRINT:PRINT "1 - Sort on Name"
530 PRINT "2 - Sort on Postcode"
540 PRINT:INPUT "Enter Choice";C
550 GOSUB 1360
560 NZ=1
570 IF EOF(1) THEN CLOSE 1: GOTO 620
580 IAX(NZ)=NZ
590 INPUT #1, N$(NZ),C$(NZ),A1$(NZ),
    A2$(NZ),PC$(NZ)
600 NZ=NZ+1
610 GOTO 570
620 NZ = NZ - 1: PRINT: PRINT: PRINT
    NZ;"Records Read": PRINT
630 ON C GOTO 670,910
640 :
650 REM      *** SHELL SORT ON NAME ***
660 :
670 FOR IX=1 TO NZ STEP IX
680   MZ = 2 * IX - 1
690   NEXT IX
700   KZ = NZ - MZ
710   FOR JZ = 1 TO KZ
720     FOR IX = JZ TO 1 STEP -MZ
730       IF N$(IAX(IX)) > N$(IAX(IX+1))
          THEN SWAP IAX(IX),IAX(IX+1)
740     NEXT IX
750   NEXT JZ
760   MZ = MZ / 2
770   IF MZ <> 0 THEN 700
780 :
790 REM      *** WRITE OUTPUT FILE ***
800 :
810 FOR IX=1 TO NZ
820   PRINT #2, N$(IAX(IX))",";
830   PRINT #2, C$(IAX(IX))",";
840   PRINT #2, A1$(IAX(IX))",";
850   PRINT #2, A2$(IAX(IX))",";
    PC$(IAX(IX))
860 NEXT IX
870 PRINT IX-1;"Records Written":
    CLOSE 2:GOTO 220
880 :
890 REM *** SHELL SORT ON POSTCODE ***
900 :
910 FOR IX=1 TO NZ STEP IX
920   MZ = 2 * IX - 1
930   NEXT IX
940   KZ = NZ - MZ
950   FOR JZ = 1 TO KZ
960     FOR IX = JZ TO 1 STEP -MZ
970       IF PC$(IAX(IX)) > PC$(IAX(IX+1))
          THEN SWAP IAX(IX),IAX(IX+1)
980     NEXT IX
990   NEXT JZ

```

```

990 NEXT JZ
1000 MZ = MZ / 2
1010 IF MZ <> 0 THEN 940
1020 GOTO 810
1030 :
1040 REM *** ROUTINE TO ERASE NAMES ***
1050 :
1060 PRINT CHR$(12):PRINT TAB(24);
    "Delete Names":FOR N = 1 TO 300:NEXT N
1070 PRINT CHR$(12)
1080 IX=1:GOSUB 1250:IX=IX-1:GOSUB 1360
1090 IF EOF(1) THEN 1160
1100 INPUT#1,N$,C$,A1$,A2$,PC$
1110 FOR NZ= 1 TO IX
1120   IF N$(NZ) = N$ AND PC$(NZ) = PC$
      THEN 1180
1130 NEXT NZ
1140 PRINT #2,N$",";C$",";A1$",";
    A2$",";PC$
1150 GOTO 1090
1160 CLOSE 1,2
1170 GOTO 220
1180 PRINT CHR$(12);"Match found":PRINT
1190 PRINT N$:PRINT C$:PRINT A1$:PRINT
    A2$",";PC$:PRINT
1200 INPUT "Delete (Y/N)";A$:IF LEFT$(A$,1)
    ="Y" OR LEFT$(A$,1)="y" THEN 1090
1210 GOTO 1130
1220 :
1230 REM *** SUBROUTINE TO BUILD ARRAY
    OF NAMES AND ADDRESSES ***
1240 :
1250 N$(IX)="" :PRINT CHR$(12):PRINT:
    PRINT: INPUT "Name      ";N$(IX)
1260 IF N$(IX) = "" THEN RETURN
1270 INPUT "First name:";C$(IX)
1280 INPUT "Addr1      ";A1$(IX)
1290 INPUT "Addr2      ";A2$(IX)
1300 INPUT "Postcode   ";PC$(IX)
1310 IX = IX + 1

```

```

1320 GOTO 1250
1330 :
1340 REM      *** SUBROUTINE TO RENAME
    AND CREATE BACKUP FILE ***
1350 :
1360 R$=LEFT$(F$,LEN(F$)-3)+"BAK"
1370 ON ERROR GOTO 1430
1380 KILL R$
1390 NAME F$ AS R$
1400 OPEN "I",1,R$
1410 OPEN "O",2,F$
1420 RETURN
1430 IF ERR = 53 THEN RESUME NEXT
1440 PRINT "Strange Error in ";ERR:STOP
1450 :
1460 REM ** SUBROUTINE TO PRINT LABELS **
1470 :
1480 PRINT CHR$(12):PRINT:PRINT:
    PRINT TAB(30);"Now printing labels."
1490 OPEN "I",1,F$
1500 IF EOF(1) THEN 1520
1510 NZ=1:INPUT#1,N$(1),C$(1),A1$(1),
    A2$(1),PC$(1)
1520 IF EOF(1) THEN 1540
1530 NZ=2:INPUT#1,N$(2),C$(2),A1$(2),
    A2$(2),PC$(2)
1540 IF EOF(1) THEN 1560
1550 NZ=3:INPUT#1,N$(3),C$(3),A1$(3),
    A2$(3),PC$(3)
1560 LPRINT TAB(4);:FOR IX=1 TO NZ
1570   LPRINT C$(IX);
1580   IF C$(IX)<>"" THEN PRINT " ";
1590   LPRINT N$(IX);TAB(IX*26+4);
1600 NEXT IX:LPRINT
1610 LPRINT TAB(4);:FOR IX=1 TO NZ
1620   LPRINT A1$(IX);TAB(IX*26+4);
1630 NEXT IX:LPRINT
1640 LPRINT TAB(4);:FOR IX=1 TO NZ
1650   LPRINT A2$(IX);",";PC$(IX);
    TAB(IX*26+4);

```



```

1660 NEXT IX:LPRINT:LPRINT:LPRINT
1670 IF EOF(1) THEN 1690
1680 GOTO 1500
1690 CLOSE 1:LPRINT CHR$(12)
1700 GOTO 220
1710 :
1720 REM ** SUBROUTINE TO LIST TO CON: **
1730 :
1740 PRINT CHR$(12):PRINT:PRINT:
      PRINT TAB(30);"File Listing:"
1750 WIDTH 80
1760 OPEN "I",1,F$
1770 IF EOF(1) THEN 1790
1780 NZ=1:INPUT#1,N$(1),C$(1),A1$(1),
      A2$(1),PCZ(1)
1790 IF EOF(1) THEN N$(2)="" : C$(2)="" :
      A1$(2)="" : A2$(2)="" : PCZ(2)=0:GOTO 1810
1800 NZ=2:INPUT#1,N$(2),C$(2),A1$(2),
      A2$(2),PCZ(2)
1810 IF EOF(1) THEN N$(3)="" : C$(3)="" :
      A1$(3)="" : A2$(3)="" : PCZ(3)=0:GOTO 1830
1820 NZ=3:INPUT#1,N$(3),C$(3),A1$(3),
      A2$(3),PCZ(3)
1830 PRINT C$(1);
1840 IF C$(1)<>" " THEN PRINT " ";
1850 PRINT N$(1);TAB(26);C$(2);
1860 IF C$(2)<>" " THEN PRINT " ";
1870 PRINT N$(2);TAB(52);C$(3);
1880 IF C$(3)<>" " THEN PRINT " ";
1890 PRINT N$(3)
1900 PRINT A1$(1);TAB(26);A1$(2);
      TAB(52);A1$(3)
1910 PRINT A2$(1);",",PCZ(1);TAB(26);
      A2$(2);
1920 PRINT ", ",PCZ(2);TAB(52);
      A2$(3);",",PCZ(3)
1930 PRINT:PRINT
1940 IF EOF(1) THEN 1960
1950 GOTO 1770
1960 CLOSE 1:WIDTH 72:INPUT "Hit return
      to continue";A$
1970 GOTO 220
1980 END

```

The structure of the complete program reflects some of the weaknesses of the BASIC language. In particular, the two subroutines at lines 1250 and 1360 are in the middle of the program.

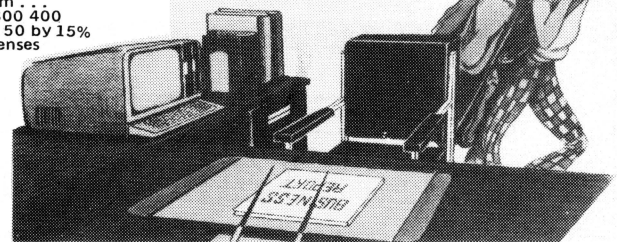
For absolute speed (not important here) they should be near the beginning of the program, while for logical structure they should be near the end. However, once they have line numbers they can't be moved and new modules (in this case the label printer and 'list to console' module) have to be tacked on after them.

That completes our first major project. Next month we'll move on to something new.



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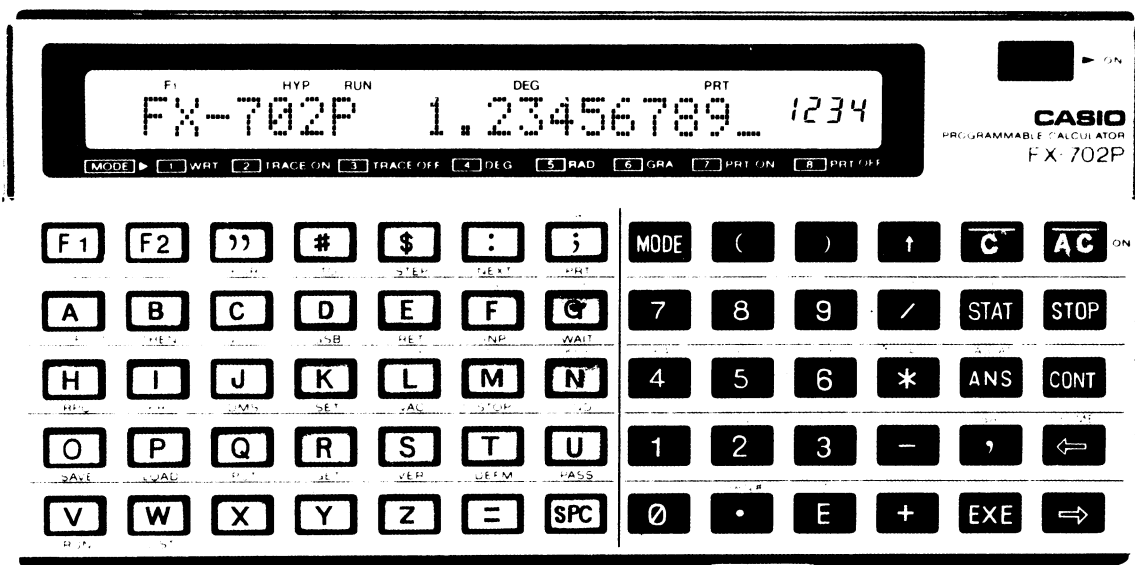
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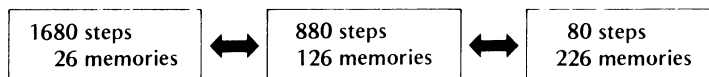
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your ZX80 computer

John Batty

OVER THE last couple of years, with microchip technology racing ahead at top speed, personal computer models are becoming obsolete within months of their release (look at the difference between ZX80 and ZX81 state-of-the-art). ZX80 users looking around the market place could therefore be forgiven for thinking they had bought a 'lemon' when comparing their machines' capabilities to those of, say, a TRS-80, PET or Apple.

All things considered though, the ZX80 is very good at what it was designed for: that is, giving a newcomer or enthusiast with a limited budget some cheap, instructive and entertaining hands-on experience at programming.

I would like to see anyone with no experience with micros walk up to an Apple, TRS-80 or any of the large machines and write a meaningful, bug-free program first time.

Sinclair machines, with their single key-stroke keyword entry and constant automatic syntax check, make it possible. Sinclair's dialect of BASIC is so straightforward and clear, programs can almost be read like a story or sheet of instructions, which of course is what they are.

People complain about the lack of commercial software available for the ZX80. Actually, there is quite a bit available and a lot of it has moving graphics. Since the ZX80 was originally produced in and for Europe, however, that's where most of the software is marketed. But let me ask a question: do you want to learn about programming micros or do you want to play TV games? If you fit the latter description, why blow a couple of hundred dollars on a computer?

The difficulty in obtaining software is, in my opinion, one of the **good** points of the ZX80. A friend of mine has been merrily hacking away on his '16K, does everything but make the tea' monster for two years. The only thing he has not done so far is write a program. Why should he when he couldn't improve on the thousand-plus available off the shelf?

Limits As Strengths

The 16K RAM pack is not in my view really necessary when seen in context with the (admittedly) comparatively limited capabilities of the ZX80. It may be useful

when playing adventure-type games, but apart from that use, for the newcomer it may even be counter-productive.

The ZX80 is producing what must be one of the most economical groups of programmers around. Those using 8k, 16K or 32K RAM machines can throw away space left, right and centre to achieve their desired effect. Not so the ZX80 user. He usually has to compress and innovate and compromise with his program to make it fit the 1K of RAM he has available. When the program runs successfully, not only is the feeling very good but you can bet the program is in its purest BASIC form (allowing for Sinclair's little idiosyncrasies, such as one statement or command per line).

There are a few tricks in Sinclair BASIC to enable the user to save on the odd byte or two in a program, and in long programs this can mean the difference between a RUN and a crash. For instance:

```
500 PRINT "ANOTHER GO? Y/N"
510 INPUT A$
520 IF A$="Y" THEN GOTO 10
530 STOP
```

Line 520 could read: 520 IF A\$="Y" THEN RUN and line 530 could, in a lot of cases, be omitted altogether. Changing 520 only saves you two bytes, but they could be critical. Of course, if there is any graphic output to the program line 10 (first line) will have to be CLS so the ZX80 will clear the screen on each new RUN. Another one:

```
500 IF X=150 THEN PRINT "MISSED"
510 IF NOT X=150 THEN PRINT "HIT"
```

Surprising as it may seem, the ZX80 will accept an open-ended IF...THEN statement. Change line 500 to read: 500 IF X=150 THEN and line 510 to read: 510 PRINT "MISSED". Line 520 would be 520 PRINT "HIT" or whatever the next command is to be. The open-ended IF...THEN trick will save at least two bytes each time you use it, and will RUN successfully. Line 510 is only obeyed if the IF control is satisfied. This works equally well with strings, such as IF X\$="Y" THEN.

A Spent RAM

One sees some pretty obvious wastage of RAM around the place. One program I saw had the lines:

```
20 LET A=RND(4)
30 IF A=1 THEN GOTO 100
```

40 IF A=2 THEN GOTO 200 and so on to line 60!

What is wrong with:
20 LET A=RND(4)*100
30 GOTO A

The ZX80 is enough of a deviation from the standard micro to provide quite a few surprises, many of which cannot be found in the manual and are only discovered by trial and error. Just as you think you have one of its rules pinned down, it'll provide an exception to that rule, so never say 'it won't do that'. Ask instead 'I wonder if I can MAKE it do that'.

It has been said that a 1K ZX80 is a non-expandable micro, and it won't support many peripherals. Last year in London there was a 'ZXMicrofair', at which disk drives, vocoder and VOX units, robot peripherals and printers, all designed to interface ZX machines, were shown. Who said the ZX80 was at an evolutionary dead end?

This month's program is my slightly modified version of the card game, Pontoon or 21. The computer will deal you cards, one at a time, each time you press "Y". If you make five cards without going bust, it'll tell you and concede the game; likewise if you hit 21.

Once you press "N", the machine will deal itself three cards, add them up and if they total less than 17 will ask for another (press "Y"). It is a reasonably fair match with all cards generated randomly, but you have a slight edge (the computer cannot get a five-card trick, and cannot stick below 17). Start the game by pressing "Y" (after RUN). The program could probably be edited down a bit more if you like, which may leave room to use face cards and aces.

Happy hacking till next month. □

ZX80 PONTOON

```
10 LET B=0
20 LET D=0
30 LET E=0
40 LET F=0
50 GOSUB 400
60 PRINT "YOURS"
70 PRINT "1 2 3 4 5"
80 PRINT C;
90 LET A=C
100 GOSUB 700
```

YOUR ZX80 COMPUTER

```
110 GOSUB 400
120 PRINT " ";C;
130 LET B=C
140 GOSUB 700
150 GOSUB 400
160 PRINT " ";C;
170 LET D=C
180 GOSUB 700
190 GOSUB 400
200 PRINT " ";C;
210 LET E=C
220 GOSUB 700
230 GOSUB 400
240 PRINT " ";C;
250 LET F=C
260 GOSUB 700
270 PRINT "FIVE CARD TRICK"
280 STOP
400 INPUT A$
410 IF A$="Y" THEN LET C=RND(10)
420 IF A$="N" THEN GOTO 500
430 RETURN
440 STOP
500 PRINT
510 LET W=0
520 PRINT "MINE"
530 PRINT "1 2 3"
540 LET Z=RND(10)
550 LET X=RND(10)
560 LET Y=RND(10)
570 PRINT Z;" ";X;" ";Y
580 IF Z+X+Y<17 THEN PRINT "CARD"
590 IF Z+X+Y>17 THEN GOTO 630
600 INPUT B$
610 IF B$="Y" THEN LET W=RND(10)
620 PRINT W
630 IF Z+X+Y+W>A+B+D+E+F AND Z+X+Y+W<22
    THEN PRINT "I WIN"
640 IF Z+X+Y+W<A+B+D+E+F OR Z+X+Y+W>21
    THEN PRINT "YOU WIN"
650 STOP
700 IF A+B+D+E+F>21 THEN GOTO 1000
710 IF A+B+D+E+F=21 THEN PRINT
    "PONTON.YOU WIN"
720 IF A+B+D+E+F<21 THEN RETURN
730 STOP
1000 PRINT
1010 PRINT "BUSTED"
```

HEARD ON THE BUS

I KEEP getting flak for my long held view that Pascal is a vastly over-rated language; but at last I can really shoot back.

To see Niklaus Wirth (author of Pascal) has decided his new language, Modula-2, was necessary to overcome the deficiencies of his earlier effort comes as no real surprise, because he really designed Pascal as a teaching tool and not for real world applications.

The really definitive put-down, however, is the following quote:

"I didn't consider Pascal because it would have meant pouring good effort after bad. Pascal is fatally flawed because of the lack of standards. I think that with serious software engineers, once there are accessible Ada implementations, we'll find an accelerating trend of people who have taken the plunge with Pascal jumping to Ada because they meet so many culs-de-sac with Pascal."

If this had come from anyone other than Kenneth Bowles, leader of the team which developed UCSD Pascal (quoted in Electronics, October 20, 1981), we might have expected some rebuttal from the ivory tower trendies who could find no fault with a language they've never had to use in a cost-effective applications development.

Coming from a man of such stature in the academic world, however, it will be hard for them to argue the case with other than emotional justification for their past beliefs.

The one good thing to spring from the popularity of Pascal is that a number of people will have learnt something useful about structure and the use of compilers. Don't hand me that hogwash about how Ada is just Pascal done right either, or you'll just be proving what a late-comer you are, with little knowledge of the history of structured languages.

The worst effect of the plethora of Pascals is learning Ada and one may be hampered by the closeness of the two languages, in many respects making it harder to unlearn the incompatibilities. Well, that's progress.

Back to BASICS

So if Pascal is not so hot and really not a good investment for your computing future, and like most people your first language was BASIC, where do you go next?

If CBASIC-2 or CB-80 are available for your machine, it might well be worth your while exploring this unusual dialect.

CBASIC is a pseudo compiler designed for business processing and CB-80 is a true compiler for the same source.

What is really great about these compilers is you can take almost any program written in the most-used versions and, with little editing, have them compiled and running. This makes the most of keeping useful the code you have already generated.

What is also good is that as you progress to more structured design of your programs, this language will allow you to use the more advanced constructs and so make your code easier to de-bug due to the almost totally self-documenting nature of well-written CBASIC source.

If you do decide to go for this language, please make the small effort to use the added features. You will find when you go to make some modification a year after you wrote the original, it will be extremely simple to see the structure and variable usage; and so your changes are much simpler to implement without chain reaction errors.

A lot of people running CP/M have a copy of the precursor to CBASIC, which was called BASIC-E. This compiler is in the public domain but be aware that it is very limited and there are many bugs in some of the early versions, which still seem to abound.

However, it is still a very cheap way to get a taste of the potential of the later product. I think Gordon Eubanks has done a fine job in producing this language, with its dual strengths. And that is probably why in the USA there are so many business programs written in it.

Speed Freak Special

For the speed freaks' benefit, I coded the Eratosthenes Sieve algorithm used in the September BYTE benchmark and compiled it using CB-80 running on an 8085. It ran the 10 iteration loop in 14.6 seconds, making it second only to the Digital Research PL/1-80, which came in at 14.0. So you don't need to worry too much about slow BASICs anymore. And if you are a beginner you'll find the transition to PL/1 too hard to get any benefit out of its slight speed advantage.

Just in case any Pascal pusher has made it this far (masochist!) the fastest Pascal on this test was Pascal MT+, at 19 seconds.

Here is the code I used. The WHILE...WEND construct would be better where both of the IF statements are used, but the code was designed to be readily



translated back to more common BASICs for comparison.

Note line numbers are not used, except where needed as targets for control transfer, and that CB-80 can use meaningful labels in place of the line-numbers anyway. The % sign indicates the variable is an integer.

If you use an interpreter you had better reduce the iteration count to one or you could think the machine had died.

```

REM INTEGER ARRAY.SIZE,I,J,K,PRIME,COUNT,TRUE,FALSE,ZERO,ONE,THREE,TEN
ZERO% = 0.
ONE% = 1.
THREE% = 3.
TEN% = 10.
TRUE% = 1.
FALSE% = 0.
ARRAY.SIZE% = 8190.
DIM FLAG.ARRAY%(ARRAY.SIZE+1)      \ array base starts at zero.

PRINT "Starting 10 iterations"

FOR J% = ONE% TO TEN%
    COUNT% = ZERO%                  \ count will total the primes.

    FOR I% = ZERO% TO ARRAY.SIZE%
        FLAG.ARRAY%(I%) = TRUE%
    NEXT I%                          \ set all flags in array

    FOR I% = ZERO% TO ARRAY.SIZE%
        IF FLAG.ARRAY%(I%) = FALSE% THEN 18
        PRIME% = I%+I%+THREE%
        K% = I%+PRIME%
13    IF K% > ARRAY.SIZE% THEN 17      \ while/wend better here
        FLAG.ARRAY%(K%) = FALSE%     \ set false = non-prime
        K% = K%+PRIME%
        GOTO 13                      \ goto left in for basic users

17    COUNT% = COUNT%+ONE%           \ number is prime
18    NEXT I%

NEXT J%

PRINT COUNT%;" PRIMES"              \ correct answer is 1899
END
    
```

Well, there's a BASIC with plenty of potential for structure and enough speed for utilities. But I don't see Bill Bolton or Les Bell abandoning C for it. Still, it may even help as a step to C, for those who want to make the transition. □

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Feedback

Send your questions about CP/M to Bill Bolton, CP/M column, *Your Computer*, PO Box 216, Spit Junction, NSW, 2088. No guarantees that your question will get answered in the column, but I will try. Source users can contact me at TCY396 (I don't read Source mail unless there is a clear subject heading).

FOLLOWING close on the heels of Digital Research's purchase of Compiler Systems, DR has purchased MT Systems.

MT Systems made its name developing and marketing the Pascal MT and Pascal MT+ compilers. More recently it has developed a speed programming system for Pascal MT+.

You should all know by now I really don't like Pascal at all. However, if I had to do something in Pascal, the MT+ implementation would be the one I would choose. Digital Research obviously thought it was a worthwhile product to complement CBASIC, CB-80 and PL/I in its range of languages.

Digital Research has recently had a large increase in its capitalisation, with a lot of venture capital entering the firm. I think DR will probably be looking at other software houses to absorb, the question is who will be next? Perhaps ISA?

SID And ZSID Patches

A number of people have asked about defeating the EI instructions in SID and ZSID, following the patches to DDT published here a few months back. Well here are the patch locations for both debuggers: the technique is the same as previously described.

SID 0B9FH and 162CH

ZSID 13D9H and 1F87H

While we're on the subject, here is a worthwhile patch for ZSID. When DR introduced ZSID it reformatted the D Dump) display so the ASCII dump was displayed below the hex dump, rather than beside it as in DDT and SID (I presume this was to make the display fit on a 64-column-wide screen).

While this is a trifle more convenient if you are looking at a stationary display, it is much worse than the old format with a scrolling display. I find the older format far superior when dumping a lot of memory, looking for an embedded ASCII message: at least you can spot ASCII text as it rolls through.

With the ZXID format this is quite impossible with a 9600-baud terminal. The following patch will convert the ZSID display to the same format as SID:

```
A>ZSID ZSID.COM
ZSID VERS 1.4
NEXT PC END
2900 0100 A9FF
#S125F
125F 5F AF
1260 ?? .
#S12C0
12C0 CD 18
12C1 ?? 01
12C2 ?? 00
12C3 06
12C4 06 01
12C5 ?? .
#S12E1
12E1 CD 18
12E2 ?? 04
12E3 ?? 00
12E4 CD 18
12E5 ?? 01
12E6 ?? .
#GO
A>SAVE 40 ZSIDW.COM
```

When ZSID relocates itself, an offset is added to bytes 12C2H, 12E3H and 12E6H.

If there is enough interest I will include patches to reduce DDT and SID displays to fit on to a 64 column display. . . does anyone still use 64 column displays?

Programming Quickie

Here is a neat six-byte routine — in 8080 (or Z80) — which can perform a hexadecimal (0 to F) to ASCII conversion. Assuming the hexadecimal digit is in the A register, then:

```
ADI 90H ; first add
DAA ; adjust result, if carry
ACI 40H ; second add, adjust to ASCII
DAA ; adjust result, if carry
```


How does it work? There are two main considerations for hexadecimal to ASCII conversion: is the A register less than 10 or is the A register greater than or equal to 10?

The first DAA instruction, which operates on the lower four bits (low nibble), adjusts the result of the ADI instruction to less than 10. Then the ACI instruction operates on the upper four bits (high nibble) by adding the carry out of the lower nibble. The second DAA instruction then adjusts the results of the high nibble to less than 10.

If the A register is initially less than 10, the first add results in 9XH. . . In this case, the DAA does not affect the A register. The second add (with carry) results in 9XH+40H=DXH (D Hex = 13 Dec). After the second DAA, the result is 3XH where 'X' is the decimal digits 0 through 9; thus the ASCII representation for decimal digit results in 39 hexadecimal.

If the A register is initially 10 or greater,

the first add results in 9XH (same as before), but the result of the first DAA is 0YH. (that is, $YH = XH - 10D$) and includes the setting of the carry flag. The next add (with carry) gives us $0YH + 40H + 1 = 4ZH$, where $Z = Y + 1$.

The last DAA has no affect. . . The hexadecimal digits 41 to 46 represent the ASCII alphabets A to F. For example, let $X = 10D = AH$, the $Y = X - 10D = 10D - 10D = 0$ and $Z = Y + 1 = 0 + 1 = 1$. The result is 41 hexadecimal, the ASCII symbol for 'A'.

The routine is simpler than the explanation!

Thanks to Kelly Smith of CP/M-NET for the original explanation.

A Patch For Submit

Most CP/M users have at some time or other longed for the ability to run a SUBMIT file from some drive other than the A: drive. If you accidentally submit a SUB file while being logged on to a disk other than A:, you find a magical \$\$\$SUB file ap-

pearing instead of your submit file being processed.

It is possible to write into a SUB file a command to log into another drive. However, you still need to go to A: to start the submit.

Here is a solution for that problem.

If you DDT or SID SUBMIT.COM, you'll notice the FCB area for the temporary file that SUBMIT.COM creates (\$\$\$SUB) has its first byte set to 00.

That means the \$\$\$SUB file will always be written to the currently logged disk, *even though it has no meaning unless it is written to A:*.

The simple solution is to change that 00 leading byte of the FCB to 01. This causes \$\$\$SUB to always be written to A:, no matter which disk the submit is submitted from. Now you can be on C: and do a submit as easily as if you were on A:.

The location to patch in the 2.2 SUBMIT.COM program is:

05BBH change it from 00H to 01H ☐

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Accounting and Library

SYDNEY software company the Automated Office has commenced distribution of its new TAO Client Accounting software package for professional accounting practices.

The package operates in most computers which support the popular CP/M operating system and have 1 Mbyte or more of disk storage.

The managing director of The Automated Office, Michael Morton, estimates there are over 20 brands of equipment available in Australia which provide CP/M, including IBM's new personal computer, the XEROX 820 and 860, DEC VT180, Wang OIS range, plus many brands available through suburban computer stores.

Features of the package include full integration with word processing, complete operator control of report presentation, automatic ledger closing, simple reclassification of accounts, optional monthly management reports and an interface to other systems such as client debtors.

TAO Client Accounting is available from dealers and computer stores for \$2350, representing a significant price/performance breakthrough. The dealer installs and tests the package on the equipment and provides all technical support.

Mr Morton, who is a qualified accountant with seven years experience in public accounting, said the package will operate on single or multiple terminal systems with either hard or floppy disks. It is ideal for accounting firms wishing to limit their equipment outlay to the \$10,000 to \$20,000 price bracket including a correspondence quality printer, he said.

The company also has over 50 volumes of software from the New York CP/M Us-

ers Group (CPMUG) available at a nominal charge for floppy disk media and postage. The software is in the public domain and many programmes include the original source code, which the user is free to modify or distribute but not sell.

The library contains an international collection of CP/M software, including application programmes, system utilities, communication programmes, compilers and languages. Each volume contains the comments of reviewers and notes on installation and operation of programmes.

The complete CPMUG catalogue and additional information is available for \$4 from The Automated Office, PO Box 490, Chatswood NSW. □

Retro-Graphics Pen

ANDERSON Digital Equipment has announced the availability of the light pen and printer interface options for the Retro-Graphics enhanced DEC VT100 terminal.

These new Retro-Graphics options will allow the graphics terminal user a more versatile system to meet his application needs, for the interaction with his graphics software and hard-copy production and duplication of the screen.

Both options interface to a common back plane connector assembly, are easily installed, and can work in tandem.

The new Retro-Graphics Light Pen is compatible with the model VT640 Retro-Graphics enhanced DEC VT100 terminal. When used with the terminal's faster screen display, the interactive device allows the operator to point at the screen to indicate an X-Y graphics grid coordinate.

The tip of the Light Pen is equipped with a sensor which

activates when lightly pressed against the CRT screen, or when touched by the operator. An illuminated phosphor of the CRT triggers the pen and the X-Y coordinate is transmitted to the host computer.

The Light Pen like the VT640's standard crosshair cursor emulates the Tektronix 4010 Graphics Input Mode. Consequently, it is compatible with existing software that makes use of this feature. The printer interface consists of a cable and ROM set. It allows the user to interface to the LA34RA graphics printer. □

Computers Talk

THE VOTRAX Type-N-Talk is possibly the most exciting and advanced speech synthesizer unit available for general use outside research laboratories, according to Dick Smith Electronics.

It enables your computer to talk to you simply and clearly, with an unlimited vocabulary. For words or phrases which give the Type-N-Talk difficulty, you can alternatively program it in direct 'phoneme' mode with a code for each sound.

Type-N-Talk adds a new world of speaking roles to your computer. By adding a truly flexible and easy-to-use speech facility to any computer, it opens up new fields of application: computers for the blind, language teaching, computer-aided teaching for small children and the illiterate.

In teaching, the computer with Type-N-Talk can actually tell students when they're right or wrong; even praise a correct answer. Computer games come to life with spoken threats of danger, reminders, and praise.

English text is automatically translated into electroni-

cally synthesized speech with Type-N-Talk. ASCII code from the computer's keyboard is fed through an RS-232C interface to generate synthesized speech. Just enter English text and hear the verbal response (electronic speech) through the audio loud speaker.

Type-N-Talk has its own built-in microprocessor and a 750 character buffer to hold the words you've typed. Even the smallest computer can execute programs and speak simultaneously. It doesn't have to use your host computer's memory or tie it up with time-consuming text translation.

The Votrax is supplied complete with 240V power supply and user manual for \$525.00. □

MiCC Bulletin Board

IN AN age when punctuality means "it should be ready within a couple of weeks of the promised date", the Mi Computer Club has achieved the impossible. Its bulletin board service to members, which was promised to come on line on January 15, beat that schedule by two days.

In fact, editor Les Bell successfully tested it a week beforehand.

The bulletin board is the most ambitious service offered to members since the club started just a few months ago. Indications are it will get plenty of use right from the start.

Twenty-two percent of the 1100 members have indicated they would join immediately, and almost 40 percent will join within the first year; after they've saved up the \$300 for the acoustic coupler.

The cost of joining the bulletin board is just \$20. There is no other charge, not even an annual fee. Members re-

ceive a loose-leaf binder to hold documentation.

Bulletin board members will be able to lodge classified advertisements, use the notice board and order club products (software, books, diskettes, club T-shirts and beach towels and the most essential *Your Computer* magazine binders, among other things) using Bankcard.

MiCC newsletter editor Laurie Smyth said the notice board would be a great help to micro users. They could use it to seek advice and should receive answers from other members within a day or so.

"Should an answer to a problem not be forthcoming within three days, the problem will be handed over to an expert at club headquarters for solution and reply", said Laurie.

The service should be of great value to members in country areas where it is often not possible to have ready access to experts.

By the way, the first member to join the bulletin board was Mr Ron Yee, a Darwin hobby-shop proprietor.

Under Telecom regulations, bulletin board membership is available only to members of the Mi Computer club. At this stage Telecom will not permit the board's use for electronic mail but, as Laurie said, MiCC has the technology available to accept electronic mail once the regulations are relaxed.

Good Rapport

MiCC has been touch with the many user groups throughout Australia, offering membership so the groups

can utilise the board to notify members of events and news, and for idea-swapping between like groups in different towns and cities.

Club president Keith Smyth said the club was building up a good rapport with many of the user groups.

"Because MiCC has no affiliation — and never will — with any particular brand of micro, we are ideally placed to act as a sort of national body to which all groups could be members, thus giving the micro-users of Australia a strong voice both as consumers and in political lobbying," suggested Keith.

The club is currently embarking on a campaign of decentralisation with the establishment of local chapters. The central committee would assist establishment and provide profession-

ally designed and printed letterheads to each chapter.

And now, here is a special item for MiCC members in Sydney and Melbourne who'd like to sell, trade or buy. The club is organising a Bits and Bytes 'Computerfest' in both cities, on Saturday, February 27.

Venues are the car parks (covered) at Polk House. In Melbourne that's at 77 Wellington Street, Collingwood; in Sydney, go to 55 Herbert Street, Artarmon. Hours are 10 am to 3 pm. Buyers will be charged \$1, sellers \$5.

The proceeds will be used for bulletin board development. For information ring Fran on 41 5161, Melbourne; or Norma, 439 6355, Sydney.

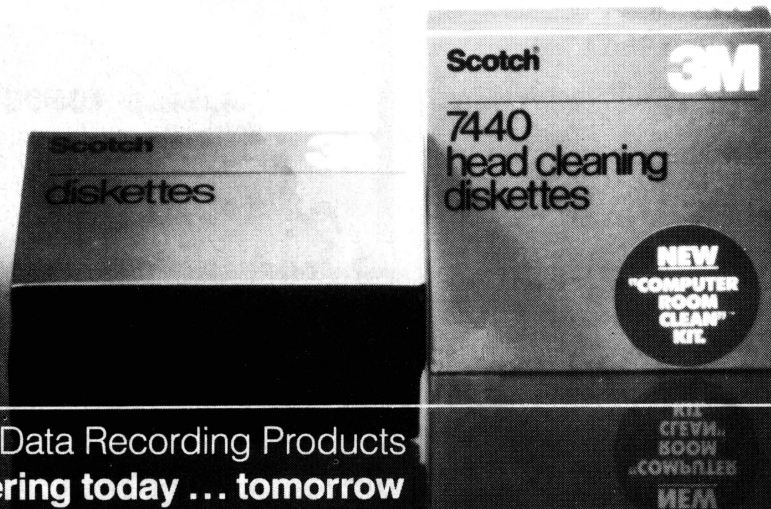
Plenty of power will be available, but vendors must bring their own tables where necessary. □

Maintaining a clean memory

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You live in a small town in the 14th century. You awakened this morning with a terrible pain in your arm, and you found a bloody gash in it. You covered it. Later you heard that the townspeople had seen a werewolf last night, and one of them wounded it with an arrow . . . "Got it in the arm!" he boasted.

You consider the wound on your arm with wonder and fear, realizing you have no recollection of last evening and how you got that wound . . .

Deducing that your worst fears are probably true, you realize that you must find an antidote.

You decide to go to a nearby dungeon that is deserted. Legend says that a powerful wizard, Evro, once lived there, but he became a victim of his own experiments. The rumor is that he had strange and deadly creatures under his power. You decide that you might be able to find some sort of recipe for a potion to cure your affliction.

Unfortunately, it's the night of the full moon, and without the cure you certainly become a werewolf once again. The moon rises at midnight . . .

Can you find the recipe and all of the necessary ingredients? Don't delay for time grows short!

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Utility Agents

A SOFTWARE package specially designed for distribution and manufacturing companies is now available through agencies in Western Australia, Victoria, Tasmania and New Zealand.

The On-Line 2000 software package, by On-Line Data Processing of Auburn, NSW, eliminates the need for product codes on all inventory items including raw materials.

A manager can quickly obtain up-to-date reports and adjust the costing of all products in his inventory without the services of a programmer, a usual requirement for some other systems.

The On-Line 2000 software package was originally conceived in 1976 by the technical director of ODP, Mr Mick Sheils, and since then has been developed and enhanced substantially. At present, more than 100 companies are using one or more modules of the On-Line 2000. □

DE VAX-11/750 Boost

A HIGH-SPEED processor for rapid execution of floating point arithmetic instructions on the VAX-11/750 mid-range computer has been announced by Digital Equipment Australia.

The floating point accelerator, designated FP750, is a field-installable option which provides the VAX-11/750 with 60 percent of the floating point performance of the larger VAX-11/780 computer system.

Advanced gate array semiconductor technology is used extensively to enhance both the performance and reliability of the new product. This new option makes the VAX-11/750 extremely viable for offloading mainframe work, especially in the areas of engineering computation and research and development.

The FP750 responds to 45 different operation codes to execute instructions on both single precision (32-bit) and double precision (64-bit) floating point operands, plus extended multiply, polynomial evaluation, and integer multiplication instructions. It also converts data between integer and floating point and between single and double precision floating point formats. □

Multi-Function Terminal

THE ZAX Micro Communicator, distributed by Z Systems of Brisbane, has found an application as a compact mini-computer field service tool. Via a standard RS-232 or current loop interface, the terminal is ideally suited for uploading and downloading firmware from its 24 Kbyte mini cassette storage device.

The terminal's flexible I/O architecture allows for transfer of binary or ASCII data to and from any of its devices. Data stored on cassette may be edited via the keyboard, a much easier method of patching over conventional paper tape.

Eprom programming capability is provided for 2716, 2532 and 2732 devices. Z Systems is offering discounts for volume purchasers and resellers. List price is \$2450 plus tax, from Z Systems Pty Ltd, PO Box 59, Paddington, Queensland 4964. Telephone (07) 36 3396. □

ADE Distributor

ONE OF Australia's largest manufacturers and suppliers of capacitors and electronic equipment, Rifa, has been appointed as a distributor for microcomputer and peripheral specialist Anderson Digital Equipment.

Under the agreement, Rifa will distribute an extensive

range of ADE systems and peripherals throughout Victoria and New South Wales.

Announcing the agreement, the managing director of ADE, Bill Anderson, said it will give his company a much broader market penetration due to the strong government and industrial market base Rifa presently has for its products.

Rifa, a subsidiary of the worldwide L.M. Ericsson corporation, also has branches in other countries.

Director of Rifa, Torsten Skytt, flew in from Stockholm, Sweden to finalise the agreement with ADE executives earlier this month.

Mr Skytt said the agreement would give Rifa a much broader product base to supply to the computer industry in Australia.

"It is a very big challenge for our company because of the success ADE has enjoyed in the past with its big range of microcomputers and peripherals, but I believe we will do well," he said. □

More Zenith Memory

A NEW model microcomputer, the Z-90, has been introduced by Zenith Data Systems.

The Z-90 is similar to the Z-89, which has been on the market for more than two years, but has more diskette storage and comes with more memory standard.

"Advances in diskette storage techniques have permitted us to design a new microcomputer with much higher capacity and at very competitive prices," says Robert K. Reid, director of sales and marketing.

The Z-90 adds a double-density disk controller card, which increases storage available on 13cm diskettes. The Z-90 also comes with a full complement of 64K of RAM, instead of 48K bytes.

A third RS-232 port has

also been added on the back panel of the Z-90 for a printer, communications device or other use.

Unlike other manufacturers, Zenith Data Systems also provides both operating system software and Supercalc planning software with each Z-90 or Z-89 shipped; and Zenith will continue to offer the Z-89 with a single-density disk controller and 48K RAM. □

Datalife Cleaning Kit

MAGMEDIA, the computer media supplier, has launched a convenient, disposable head cleaning disk to remove debris that contaminates the drive heads in computers and word processors.

By running the Datalife cleaning disk made by Verbatim USA, the drive heads are thoroughly cleaned in 60 seconds. Each cleaning disk is presaturated with a cleaning solution and sealed in a protective foil pack.

Datalife head cleaning disks provide a safe, reliable method of cleaning the surface of all magnetic recording heads currently available. All materials used in this product either meet or exceed ANSI specifications pertaining to flexible disks used in drive systems.

The manufacturers state that a fresh disk should be used for each cleaning to avoid adding accumulated debris from a previously used disk, and that heads should be cleaned daily, or at least once a week.

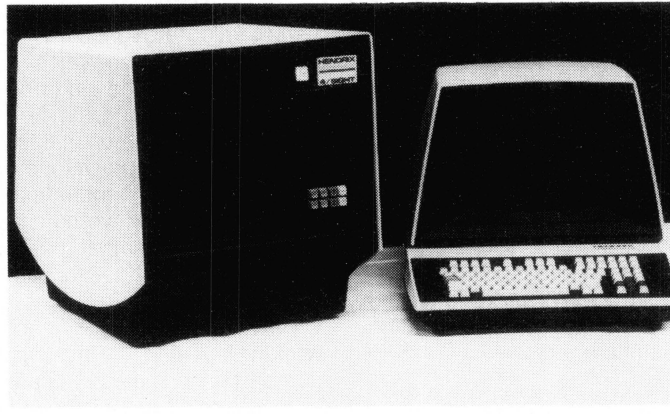
The Datalife disk will clean single or dual head drives, and is claimed by the manufacturers to cost the same or less than other less effective head cleaning products. It is available in 20cm or 13cm sizes. The kit consists of two disposable cleaning disks with instructions, or folders of 10 disks. □

Photocomposition

QUEENSLAND'S Kangaroo Point College of TAFE is updating its existing computerised phototypesetting system with the installation of a Hendrix HS42 newspaper text editing and production system at its School of Graphic Arts.

The new system will put Kangaroo Point College in the forefront of computerised photocomposition training in Australia. It will enable the college to simulate a working commercial environment encountered in production houses throughout the world, according to Mr John Price, senior technical teacher.

Supplied by the TCG



Group of Sydney, Australian agents for the Hendrix product range, the system comprises six Hastech Edit III video display terminals, two 4/sight terminals, a lone printer and a direct on-line in-

terface to a Linotron 202 supplied by Mergenthaler Linotype. Output will be on resin coated paper processed through a Permakwik processor ordered from VGR Compugraphic. □

and neutral without the metallic tones usually attributable to electronic voices. □

CCS2422 Controller

CALIFORNIA Computer system's 2422 floppy disk controller is an S-100 compatible board which can control four drives in any combination of 13cm and 20cm single or double-sided drives. It can read and write both single density (FM) and double density (MFM) soft sector diskettes.

An on board 2K Eprom contains monitor firmware compatible with systems using CCS 2810 CPU or QT SBC 2/4 CPU.

The 2422 controller is compatible with IEEE proposed standards for the S-100 bus, thus making it bus-compatible with most of the S-100 systems currently on the market. The drive buses are designed primarily to be plug compatible with Shugart 800/850 and 400/450 drives, and all drives using the same bus.

Western Digital's FD1793 disk controller chip used by the 2422 reads and writes diskettes which conform to the IBM 3740 format for single-density diskettes or IBM System 34 format for double-density diskettes. These contain 128, 512, 256 or 1024 bytes per sector.

All 2422 controllers are assembled and tested according to CCS's stringent industrial standards. The 2422 is supplied assembled and tested for \$376.00, with full documentation including 2.2 disk monitor Eprom and a copy of Digital Research's CP/M Microcomputer Control Program.

Contact QT Computer System, 283 Clarence St, Sydney, NSW. Telephone: 29 2402 or 922 1709. □

Direct Marketing!

PERSONAL computers in thousands of business and professional offices throughout Australia will become an advertising medium for Scotch brand magnetic computer media supplier 3M Australia.

A promotional 3M message will appear on the screens of up to 15,000 personal computers linked to the on-line data base The Australian Source.

The message will appear for about 30 seconds and the name of the nearest authorised Scotch brand media outlet will appear when the computer operator feeds in the post code of the suburb where he operates.

Mr Gary Alpert, managing director of The Australian Source, which is now taking subscriptions, expects 15,000 personal computer memberships by December

Currently there were about 16,000 microcomputer and 5000 to 6000 S-100 computer users with respective growth rates of 2500 units and 500/600 units a month. □

Magic Wand

WARBURTON Franki has announced Zenith Data Systems is now supplying Magic Wand, a word processing program for its microcomputer systems.

"With powerful features and a quality training course, Magic Wand is a quite flexible program and is easy to learn and use," according to Robert Reid, director of ZDS sales and marketing.

"And even with advanced features, such as the ability to print and edit at the same time and make commands in a single keystroke, Magic Wand is still a competitively priced program," he said.

Magic Wand is compatible with CP/M, the most widely used operating system for microcomputers. In addition, the program also can merge letters and pre-recorded addresses, greetings or other information.

This special merge feature is built into Magic Wand, Reid explained, while users of other word processors have to purchase a mailing package separately to accomplish the same tasks. □

Speaking Chips

LOCAL manufacturer Hypercom has announced the release of a locally developed voice output system (VOS 2200) that's claimed to be the first fully operational system released in Australia.

The system replaces by voice the output a computer would normally display or print. It was developed originally for the Hypercom manufactured dataphone used to transmit information to a host computer via a standard telephone line.

The basic VOS 2200 was developed from the Ohio Scientific standard voice output package, the Votrax unit, and can be programmed to provide three types, or levels, of voice. The standard package sounds natural and has a restricted vocabulary.

The sound can be programmed on request to provide specific responses depending upon the application. Appropriate words are selected from a 500 standard word vocabulary and programmed according to user requirements.

The sound is humanoid



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The Silence + has become one of the most tried and proven motherboards on the market. Using a unique grounding matrix, each line is completely surrounded with ground shielding which eliminates necessity for termination and gives the unit a very high cross talk rejection. One of the OEM customers has used the Silence + as high as 14Mhz without terminations.

FEATURES:

- LED power indicator
- Eliminates necessity for termination
- Fits most industry standard mainframes
- Available in 6, 8, 12 and 18 slot configurations

QTCMB6BB	6 Slot Bare Board	\$ 31.00
QTCMB6A	6 Slot A&T	\$ 81.00
QTCMB8BB	8 Slot Bare Board	\$ 33.00
QTCMB8A	8 Slot A&T	\$104.00
QTCMB12BB	12 Slot Bare Board	\$ 39.00
QTCMB12A	12 Slot A&T	\$138.00
QTCMB18BB	18 Slot Bare Board	\$ 61.00
QTCMB18A	18 Slot A&T	\$178.00
S100 Sockets	Solder Tail (Gold)	\$ 6.30

SYSTEM + II (2MB +)

Computer system with 8" Dual Sided Drives (uses Y-E DATA YD174 Disk Drives) Terminal not included.

A&T (6 Slot)	\$3883.00
A&T (8 slot)	\$4083.00

QT Systems are designed for both businessmen and engineers in accordance with the latest IEEE standards. Among other functions, they can be used for accounting and word processing as well as a variety of scientific applications. The systems are available with MP/M or QT DOS operating systems to allow multi-user, multi-tasking operations. QT also offers a full line of business and applications software, ranging from a business package to word processing.

Technical specifications: 4 MHz Z-80 CPU • Dbl-sided, dbl-den 5 1/4" or 8" floppy disk controller (handles both drives simultaneously) • CP/M 2.2 included • 64K RAM, expandable per your requirements • Comes complete in single mainframe • RS232C serial port • Parallel port • Hard disk compatible • Monitor program & disk routines included on EPROM • Power-on/reset jump to monitor program • Documentation included • Extensive software available.

SOFTWARE +

Word processing • System utilities and diagnostics • Games • CP/M users group diskettes \$10.00 each, catalogue \$6.00 • Pascal, Fort, Tarbell Basic, Fortran and most other compilers and utilities are available • Complete range of business software • Custom programming can be arranged on a fixed price or hourly basis.

SBC2/4 Z80 S100 SINGLE BOARD COMPUTER

The QT Computer SBC2/4 Processor Board is a versatile and powerful Z80 based design which is compatible with the proposed IEEE S-100 bus standard. Although the SBC2/4 may be used as the host CPU of a large system, it has all the necessary features to be used as a stand-alone computer system.

Unlike old designs it will work reliably with dynamic RAM boards and more importantly with soft sector disk controllers, and hence standard versions of CP/M. This will give you access to the largest software base for microcomputers.

- Z80A 8 bit CPU
- 2 or 4 Mhz Switch selectable
- 1K RAM (which can be located at any 1K boundary)
- Full 64K use of RAM allowed in shadow mode
- DMA compatibility allows MWRT signal generation on CPU board or elsewhere in system under DMA logic or front panel control
- TWO programmable timers available for use by programs run with the SBC+2/4 (timer output and controls available for use on CPU board).

Shipping weight: 2lbs.

QTCB24B	Bare Board	\$ 66.00
QTCB24K	Kit	\$199.00
QTCB24A	Assembled and Tested	\$269.00

MF + MD MAINFRAME



The MD+MD Mainframe offers the same quality as the MF+. It accepts two 5 1/4" disk drives with remaining space for either a 6, 8, or 12 slot Silence Plus Motherboard.

QTCMFMD	without Motherboard	\$400.00
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QTCMFMD8	with 8 Slot Motherboard	\$500.00
QTCMFMD12	with 12 Slot Motherboard	\$540.00
QTCMFMDB	bare metal work	\$175.00

Also available without cutouts on front panel

DISK CONTROLLER

CCS2422A features ROM bootstrap loader and monitor • CP/M 2.2 with documentation included • Accepts 5 1/4" and 8" disk drives • Double sided/single sided select • Read, write IBM 3740 or system 34 single or double density • Fast seek available for voice coil operation • Automatic disk density determination • ROM bootstrap phantom.

CCS2422A A & T Incl. CP/M 2.2	\$399.95
JADE DD Bare Board	\$ 85.00
QTFDC II A&T Incl. QT DOS	\$379.00
Disk Drive cables made to order	P.O.A.

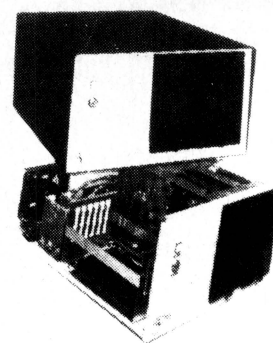
MINI-SYSTEM • (1/2MB •)

Computer System with 5 1/4" Single Sided Drives (uses TEAC FD-50A Disk Drives) Terminal not included.

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FEATURES:

- Accommodates and 8" standard disk drive (801R, DT-8, etc.)
- IEEE S-100 Silence + 6, 8 or 12 slot motherboard available. (See motherboard description at left.)
- Keyed power switch.
- Reset switch on front panel.
- Anodized 6, 8 or 12 slot cages.
- Quiet fan provides cool system operation featuring filtered positive air pressure. User may add two additional fans for the 12 slot if required.
- Detachable line chord plugs directly into EMI filter for electrical noise suppression.
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- 2 50 pin plug connector cut outs.
- 2 DD55 cut outs.
- Dimensions 9 5/8" x 17" x 21" (HxWxD)
- Power supply +8V@25A/+16V @ 5A/+5@2.5A/5@5A/+24V@3A
- Input Voltage 110-113VAC/220-240VAC 50-60 Hz

QTCMFDD	without Motherboard	\$575.00
QTCMFDD6	with 6 Slot Motherboard	\$625.00
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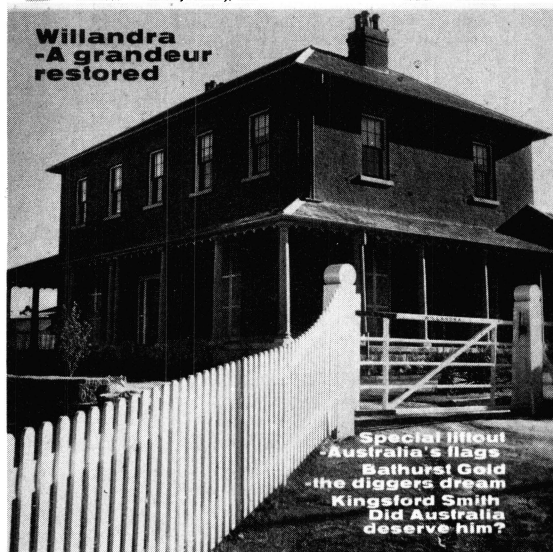
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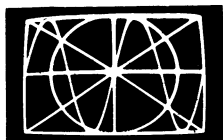
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your computer clinic

How Do I Delete?

AS AN Apple I user I am interested in the tips in Your Apple Computer.

In your November issue Steven Zanker says an Applesoft program can be protected from modification by entering 0 POKE2075, 255: POKE 2076, 255. "Later in the program insert a line to delete line 0," he says.

I have been trying for weeks but to no avail. Can you please tell me how to delete line 0 from the program.

RICHARD BENNETT
West Pymble, NSW

To get rid of the line use DEL 0,0 and your problem will vanish. We tried it and it worked. ☐

Which Cheap Micro?

I AM NOT completely sure how kit computers compare to other computers in their price range.

At school I'm doing Computer Studies and am very interested in micros. I would like to buy a fairly cheap micro, so I was wondering if you could give me some advice on whether to buy an instructor 80 or ZX81 or something else.

JIM LOWE
Devonport, Tas

Certainly can. The Instructor 80 would appear to be the best for education and long term growth of a system. It can be expanded to do a series of things as you become more expert.

Games Conversion

HOW EASY is it to convert games programs written in Microsoft BASIC into CBASIC? In particular, I was thinking of those games in the CP/M Users' Group.

M.J.,
Manly NSW

In some cases, you might

be lucky and get programs to compile first time. But generally you'll have to do a bit of fiddling with an editor first. CBASIC, being a compiled language, is a bit more fussy about array declarations and such than MBASIC. You'll need to remove any CLEAR statements, for example. Don't worry about all the line numbers; although CBASIC doesn't need them it won't get too upset by their presence, and the compiler listing will show you which line numbers are unreferenced and can be deleted.

Disk file handling, particularly with random files, is quite different and will require fairly extensive editing and some rewriting. However, not too many games use files. Finally, pay close attention to the operation of the RND function and the RANDOMIZE statement.

Baud, Bawd or Bored?
WHAT'S a baud?

R.M.,
Geelong, Vic

A baud is a unit of rate of data transmission; one bit per second. Presumably named for Baudot, the fellow who designed the Baudot code used by telex machines (five bits per character), and totally different from ASCII (seven bits per character).

On a serial data line, however, there are more than just the minimum data bits. Every character is preceded by a start bit and is optionally followed by one bit representing odd, even, or no parity. This is then followed by one, one-and-a-half or two stop bits. All up this makes 11 bits to transmit one seven-bit character. Thus 110 baud equals 10 characters per second, the speed old-fashioned mechanical teletypes work at.

your computer text file

A Mistake? Who, Us...?

HAS Mrs Malaprop been reincarnated? Please tell us more about "Joseph's Injunction Machine" mentioned on page 25 of your November issue, in the article Computer Growth.

Also, what happened to the book reviews that should be on page 38?

G.W. SWAINSON
Kilsyth, Vic.

Er, would you believe a hot new hardware development for legal offices around the country (we were meant to be keeping it a secret, but it just slipped out). It was pure coincidence that this item appeared in a story where we should have been telling you about the Josephson Junction — must have been the similarity in names that made us put it there...

Um, the book reviews were dropped out in a last-minute re-organisation of the issue. They actually appear this month.

Er, is sorry enough...

Tandy Owners Beware

MY WIFE and I recently visited Sydney and took the opportunity of purchasing two or three computer games on 13cm floppy disks. These were supposed to be okay for a TRS-80 with 32K capacity and one disk drive. Our machine is a TRS-80 Model III, 48K with two drives, so we felt it should have been suitable.

On returning to Cairns we ran the disks as per the scanty instructions. The result was nil. We then took the disks round to the local Tandy dealer, who found they were in a mode suitable for the Model I TRS-80. He obligingly converted one disk to suit Model III. Two disks, however, are protected in such a way that we cannot convert them.

I am writing to make others aware of the pitfalls awaiting the unwary who may otherwise lay out \$100 or so and be disappointed.

I feel computer centres should be more au fait with the products they sell, and the

people who market the games should be more explicit with their instructions (there was an error in a set of special instructions) and more detailed in their labelling of machine suitability.

DENIS W. BROOKS
Freshwater, Qld

Missing Pocket

AFTER HAVING read the first two issues inside out, I waited anxiously for the September/October edition of *Your Computer* only to face disappointment.

Upon arrival of my first subscription issue I noticed that something was missing; my two favorite departments, namely Your ZX80 Computer and Pocket Programs.

As a ZX80 user, I ask you what has happened to the life-lines of we under-financed computer boffins? I can only assume the reason for this unfortunate omission is the lack of reader input.

Anyhow, thanks for a refreshing outlook on the Australian computer scene.

JAMES C. CANNING,
Frankston, Vic.

Joseph's Multi-coloured Logic?

YOUR COMPUTER is to be congratulated for drawing attention to the work of the great but little-known Oxford logician Prof J.C.L. Joseph (YC, Nov '81, p 25).

Of all his many contributions to the foundations of computer science, perhaps the greatest was his most basic tenet: *you can't argue with logic*. In honour of the great man, this principle is generally known today as Joseph's Injunction.

While others struggled with the concept of the stored program, Joseph realized this approach was fundamentally misguided.

He saw clearly there could be no hope of maintaining adequate standards of logical rigour in any machine which relied on the vagaries of human input. Conse-

quently, he struggled with the design of a computer whose behaviour would be totally determined by its own internal configuration, and would simply reject outright any attempt at human interference.

But like most pioneers, Joseph was ahead of his time. It was not until the early 1970s — the heyday of the large mainframe — that machines embodying Joseph's principles became common.

Unfortunately, the last few years have seen an unaccountable regression to less satisfactory concepts. With the advent of personal computers, responsive as they are to every irrational whim of their owners, it is clear Joseph's high standards have been abandoned forever. If Joseph were alive today, he would turn in his grave...

Finally, in order to dispel a surprisingly common confusion, it should be emphasized that devices based on Joseph's principles are completely unrelated to the super-conducting switching element which bears a somewhat similar name.

I refer of course to the Josephson Junction.

PETER FURNELL
Cremorne, NSW

Thank you for your informative letter and your vote of confidence in *Your Computer's* staff. It is both a pleasure and a privilege to highlight the work of little known inventors with the view of gaining them a place in the scientific hall of fame soon to be constructed alongside the proposed Parliament House in Canberra.

But honestly folks, a joke is a joke and as Mr Furnell elegantly points out, we have made a mistake. There is in fact no such thing as the Joseph's Injunction, unless one is referring to the writ placed before the Supreme Court by a gentleman of that name.

But having received Mr Furnell's letter, we find we have stumbled across something of vast international significance. Yes, it's the Furnel and Scarati acid driven typewriter. Could there be a connection? —Ed.



your TRS80 computer

R.G. Stevenson

ALTHOUGH this is my second column, it may be appropriate to provide a few background details about myself.

I started in computing in 1978, shortly after Tandy released the TRS-80 locally. This gave me the tremendous advantage of learning and 'growing' with the scene in Australia. Of course we're all learning and growing still; but I truly sympathise with those who come in now to find a bewildering array of information to absorb. Stick with it; I promise you'll have tremendous enjoyment, maybe frustration too as you progress.

To date I've done six courses in BASIC and assembly, because I enjoy the class situation. I'd recommend this as a very efficient way to really 'get a feel' for the subject. While I like to understand the theory of the hardware, I certainly don't want to get in there with soldering-iron and screwdriver! So you won't find much hardware-orientation here! Perhaps elsewhere, if there's an interest in TRS/System 80 hardware.

Computing for me is strictly a hobby; it's said I work hard to keep it so! I run a small printing business in Adelaide and dislike (but realise the necessity for) office work. I find business programs boring, so you

My equipment is modest. Level II Model I, 48K in keyboard, Olivetti Praxis typewriter interfaced as a printer.

My particular liking is for machine-code (assembly) routines used from BASIC. I also like 'fiddling and improving' other people's programs until they run to my satisfaction; then I promptly lose interest! In fact, when a program's running well, that's it for me.

Adelaide Users' Group

As secretary of the Adelaide Micro Users' Group, I'm naturally pleased that *Your Computer* has reviewed our newsletter, and I hope this will continue.

Apart from the blatant 'plug' for our group here, I'd like to put a case for more liaison between computer groups within Australia. Not just to stop us all 'reinventing the wheel', but to allow us to see the possibility of inventing one! In the last 18 months (that's half AMUG'S life) we've seen a tremendous growth rate, from 30 members to over 120. And I know we're not alone here.

I don't want to conduct such a liaison on these pages, but I'm sure YC's editor and indeed other readers will be interested to read results of such liaisons. I feel we have much to offer each other in the club/committee area. So please contact me at the address on the clubs' page; by voice-tape if you find it more convenient.

The purpose of this column as we see it is to provide information — hopefully 'rivetting' — for TRS/System 80 users. While the principles may apply to other systems, we don't apologise for such a specialisation.

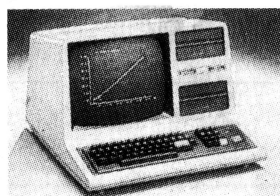
As most news events take place in USA, I warn you not to look here for the latest. News is seldom limited in interest to TRS/System 80s, so it appears elsewhere in these pages. And it would be silly to ignore the existence of 80 microcomputing for news and gossip related to TRS/System 80.

Therefore, in this column I will attempt to answer readers' letters and questions: here if they seem general, or privately if I consider them too specific. Send them to PO Box 216, Spit Junction, NSW 2088.

I'll also be providing useful tips and hints. For I firmly believe it's the way of thinking that's important, not just the learning of facts. To me, that's what is meant by computer literacy. Today's school students are learning about computers. Certainly the hardware will have changed by the time they need to use their knowledge, but not the way of thinking they've learned.

The American Scene

It seems the big thing in America for the hobbyist is to have a modem and spend vast amounts of time on bulletin boards and the like. Obviously these are minute in comparison with The Source, but still a very real way of life in the US, it seems. Any comparison with the CB radio craze of not so long ago?



Still from USA, there are rumours of illegal Model 1s migrating (possibly by swimming) from Mexico. And to be honest, the lack of software for the Model III surely is the reason. Sure, it's the same as when the Model 1 first appeared, but who wants to go through all that again?

No really, it's not nearly as bad as it was then. But is it a case of the old devil we know is better than the new (improved) devil we don't know? It is a bit sad, though, to see people who just want to play games (nothing wrong with that: all I do is play with mine) buy a Model III when I believe a Model I would have been a better choice for this purpose.

System 80 Sound

It seems vast numbers of System 80 users are not aware that to send the sound output (from sound programs and games) out the second cassette line, all that's necessary is to issue an OUT 254, 4 instruction, either in BASIC or machine code at the start of the program. It will remain that way until you drop out of the program. Yes, I know it won't work with all programs, but it is worth a try.

As an example, I added the necessary four bytes to the front of the Big Five 'Attack' program and moved the entry-point forward four bytes. So if it's that simple, how about trying it yourself? Really, the hardware mod is superior though.

Too Many DOS Systems

I was truly glad I'm not a disk user when I witnessed a disaster caused by losing track of which DOS was in memory and which was on disk. So a word of warning: if you think you're expert enough to run more than one DOS simultaneously, be prepared for the worst!

As a final hint for the month; to set Memory Size (Protect Memory) from BASIC: POKE 16561, LSB: POKE 16562, MSB: CLEAR 50. So if you want to protect memory at 32512 (7F00H), POKE 16561, 0: POKE 16562, 127: CLEAR 50.

The CLEAR is necessary to reset other pointers, and the 50 is just the normal default. It can be any value, but must be a value, not just CLEAR. Do this as the first line in your program as, obviously, CLEAR will reinitialise all variables.

More on this later, if requested.

Have you ever wanted to write programs that would stay in your COMMODORE permanently? Extend BASIC, write security programs, special print routines? And put them into an EPROM and plug them into your COMMODORE? (and some other popular micros)

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HOW YOU USE IT You need access to the Write Enable signal in your microcomputer. This is easy in the COMMODORE - we provide the lead, adaptor, and instructions. There is no soldering or hardware modification. You only need to know how to lift the lid. You just connect this wire and write to the RAM in the normal way. When you remove the wire you can no longer write to it - only read it. Now you can switch off, unplug INSTANT ROM and place it in the carrier provided. Then you can take it to a PROM copier, and burn an EPROM from it. And then use it to write a program in another socket. But why not use it as it stands? It's permanent, yet you can still change it if you want to. You will have to use your microcomputer occasionally, of course - to keep the batteries charged....

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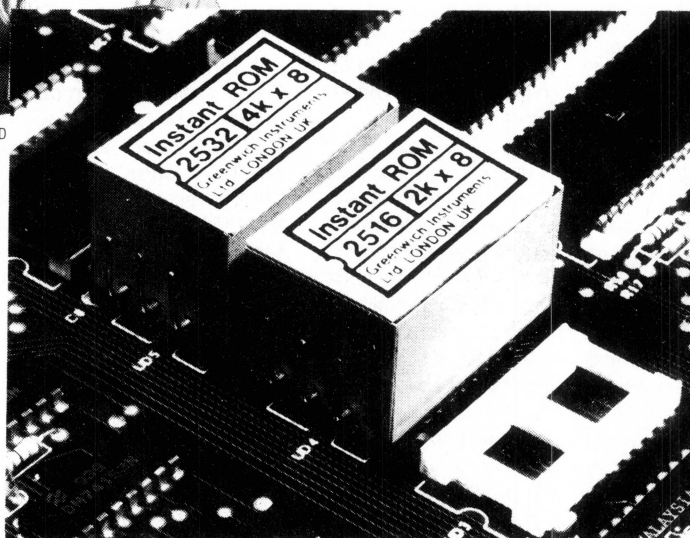
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YC 8

I HAVE been doing a lot of assembler (or machine code) programming lately and thought other programmers would be interested in what I found out about OSI's version of 6502 assembler programming, using a disk system.

First, some good and bad points. OSI will supposedly sell you the source code for their OS65D (V3.2) Operating System on a disk. But the price is around \$400, which is much too high for casual use, and I have no idea of delivery times. (I have had a 13cm version of OS65D V3.3 on order from the factory for over eight months, but no sign of it yet).

The good part is Software Consultants, of 7053 Rose Trail, Memphis, TN 38134 USA, has disassembled OS65D and sells this as its *OS65D V3.2 Disassembly Manual* for only \$US24.95. I have found this to be an absolutely invaluable (even essential) manual for anyone who is into machine code programming.

This manual gives the hex address and data, and disassembled op codes and detailed comments, some of which are (correctly) quite uncomplimentary of OSI programming techniques. Lines from the manual are similar to the ones shown as an example:

```
2449 BD 3E 5A GETNUM LDA TRKNM,
X GET CURRENT TRACK NUMBER
```

```
244C 18 CLC ADD 1 TO CURRENT
TRACK NUMBER
```

The main complaint of both Software Consultants and myself is the programmers from Ohio seem to love self-modifying code. I guess it does save a byte or two, but it can cause lots of problems and is more than likely to be responsible for some of the bugs in OS65D and OS65U.

My recent spate of assembler activity was due to having designed a 6502 single board computer (SBC). This has 8K of 2114 RAM, 8K of 2716 PROMS, 60 I/O lines from three 6522 VIAs, a serial port (6850) and two Analog Devices built 8-bit digital to analog converters, all on one 20cm by 25cm printed circuit board. After sitting there gazing at my marvellous board, I thought it only fitting that I actually do something with it, like putting in the number crunching program it was de-

veloped for. This raised several problems, as I wanted to use the parallel ports on the SBC when I was developing the program. Also, as the SBC was untested as yet, I needed some way to see if it was operating correctly.

What I really needed was a \$15,000 Tektronix emulator, but that was way out of my price range. However, after a little thought it seemed I could use my OSI C4 minifloppy system to run the SBC for testing and debugging. First, I made up a cable with 40 pin DIP insulation displacement plugs at each end.

Next, I carefully removed the top of one plug and soldered a 40 pin integrated circuit socket on top. This gave me a ribbon cable with a 40 pin DIP plug and socket at one end and a 40 pin DIP plug at the other end. The 6502 CPU integrated circuit was then removed from my C4, plugged into this 40 pin socket and the 40 pin plug on this end plugged into the 6502 socket on the C4. (Got all that?)

The effect of all this is to give me a ribbon cable with a 40 pin DIP plug which is effectively a 6502 CPU chip. When this is plugged into my SBC it enables all the power of my C4 disk system to be used to debug and program the SBC, without needing a monitor, keyboard or display on the small computer — or the aforementioned Tektronix emulator. The only changes needed are three switchable links on the SBC, to readdress the on-board RAM and PROMS when in the Emulator mode.

Back to the Flowchart

Once all the hardware was ready, it was back to the old flow charts to design the software. I should mention to all you BASIC types out there that assembler programming is not all that hard, just very slow to write compared to high level languages.

However, when you need some code to run very fast, well-written machine code will surpass BASIC by running around 50 to 100 times faster. To show how significant this can be, a sort in BASIC that takes one hour would take less than one minute to run. So don't let assembler frighten you off. Have a go with a simple program — try writing your own screen clear program for instance, (more on this next month).

Well, now we have written the program and typed it into the assembler, you need to run the program on the SBC. OSI's

assembler uses the A3 command to put the OBJECT code in memory. (For you assembler beginners, the SOURCE code is the code you type in to the assembler, using mnemonics such as LDA for 'load the accumulator', plus any explanatory comments. The OBJECT code is the actual machine code that the computer runs).

However, when you use the A3 command to put your OBJECT code into memory, make sure that you limit the top of memory the assembler uses, with the H command (this is for disk systems).

As an example, if your machine code program is to be placed in memory at \$7000, type H6FFF to stop the assembler overwriting your program at \$7000 (\$ signifies hexadecimal). I can assure you that very funny error messages are generated if you don't, and I only found out how to stop them by actually spending an hour reading the assembler manual. I think there is a moral here somewhere; or as an ancient sage once wrote — when all else fails, consult the instruction manual.

See How They Run

Now that the software is (hopefully) all running correctly on the C4 Emulator, it is necessary to put this in a PROM, so the SBC can be used as a stand alone system, without tying up the main C4-MF. The PROM is designed to reside at addresses \$F800 to \$FFFF. As there is no RAM memory there, we cannot assemble the program at the same address as it will run.

The secret is the M command. This enables a program to be placed in memory at (say) \$6800, but the actual code generated is designed to run at \$F800. If M7000 is used, the code at \$6800 will run correctly when the PROM programmer puts this into the PROM, and this PROM is placed in the SBC and resides at \$F800.

Although it is not mentioned in the manual, the M wraps around when going from FFFF to 0000. This wrap-around works for M7000 in this fashion — F800 (1), 0800 (2), 1800 (3), 2800 (4), 3800 (5), 4800 (5), 5800 (6), 6800 (7), where \$6800 was where we had placed our code with the A3 command.

That's a brief synopsis of how I my SBC came to life. There were some other assembler notes I wanted to include, but they'll have to wait until next month.

your PET computer

Peter Sandys

IT WOULD appear the Commodore PET as we know it is not going to survive much longer. The PET was first launched in late 1977 in its old style, with the calculator keyboard and built-in cassette deck. It has evolved over the years to the latest version of the Fat 40, with a new BASIC 4K ROM.

The name PET was, according to one source, a play on the PET rock fad. The Personal Electronic Transactor bit was used to give it a less frivolous reputation. According to Donahue and Enger (*PET/CBM Personal Computer Guide*) transactor means that which carries out, performs, conducts, or completes.

Commodore seems to have had a love/hate relationship with the name. Those who have been able to see the various versions of the PET would be amazed with the great variety in the face plates of the PET, even though they were the same model and ROM. In later years the PET became the more sophisticated CBM, although in the eyes of the public it was and always will be the PET.

Compared to the Apple and TRS-80, the PET was much neater and friendlier to its owner. The PRESS PLAY ON TAPE #1 and FOUND 'PROGRAM NAME' are examples of its thought and refinement. The reliability must have caused Commodore much loss of revenue in its service department.

The PET, although well designed, failed to attract the entertainment soft-

ware writers, due to the lack of high resolution graphics and the single disk drive, the cost of upgrading the original 8K machines, and the constant changes in the ROMs.

Lack of Software

This lack of software is clear to any Commodore owner. The hassles to the shop and the PET owner when a program would not run — because it had some machine language routines and had been written on a different ROM machine — are well known by all of us.

Commodore insisted that throughout the PET range the BASICs were compatible. But in reality most programs, especially Arcade-type games, needed machine language for speed and realism. Even so, the claim that the BASICs were compatible was proved true when the BASIC 4 arrived, as it reserved the string D\$. Try re-recording Temple of Apshai replacing all the D\$s.

This lack of software is one reason why I believe the Commodore PET will need to be either revamped, both in price and marketing. Further, it's come to my attention that it's possible for the Fat 40 to be converted to an 8032 for around \$300. I must emphasise though that this conversion does not yet guarantee the 8032 software will always run on this converted machine. Inside is an 8032 motherboard, and Commodore has conveniently supplied the 80 column VDU.

The last reason is the VIC. Even though its introduction has been delayed, it will create for Commodore a new marketing base. With the introduction of software for the VIC, this computer should create a new market for experienced PET programmers.

Better Investments

Over recent months there appears to have been a greater emphasis by software houses on marketing programs which will provide the greatest return for the investment made. No longer is the development of entertainment software left up to the dedicated hobbyist. It is big business. For example, a program for the Apple called 'Apple Galaxian' sold over 20,000 copies in the US.

Software houses appear to be emphasising the Apple, Atari and TRS-80. But the VIC has been selling well in the US and will undoubtedly attract the interest of these companies. The only thing that will hinder any development of VIC programs will be the advent of a new ROM.

It's for the above reasons that I believe the PET will find the market it enjoyed in the past reduced. Alternatively, Commodore will have to change its marketing strategy by dropping the 4016 and replacing it with a cheaper 4032, and at the same time reducing the cost of the 8032.

The latter strategy is the one I felt Commodore should have pursued from early 1981. □

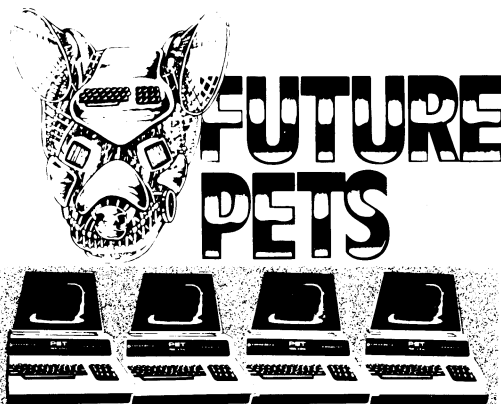
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your SORCERER computer

Paul Beaver

THERE has been so much written about CP/M that I think one of the alternate DOSes for the Sorcerer should receive some publicity.

I am going to look at the MDOS and Micropolis Disk BASIC, supplied with the Micropolis Master disk drive. For a long time the Micropolis drives were the only ones available for the Sorcerer (until the recent release of the Exidy FDS and Vista drives, the CP/M was an optional DOS for the Sorcerer). Even with the competition of the other drives the Micropolis is very popular.

We will start with some of the MDOS commands.

INIT [drive no] initialises (formats) — creates an empty directory and prepares the disk for use.

FILES [drive no] displays the files in the directory of the disk for that drive number.

SCRATCH "[drive no:]filename" removes a file from the directory of a disk — that is, erases it.

In the way of disk utilities you have three routines.

FILECOMP allows you to copy a single file from one drive to another.

DISKCOPY, which copies the entire contents of one disk to another, can be used on a single drive or multiple drive system.

COPYFILE copies a single file from one disk to another on a single drive system. By the way, Dick Smith Electronics has just released a copyfile utility to work under CP/M on Micropolis or FDS drives.

All must use an initialised target disk for copying files.

Moving into the Micropolis BASIC, the structure of the BASIC is similar to most others, however (do you notice how there is always a 'however'?), there are some differences. Here are a few of the more surprising ones. . .

To display the files of a disk's directory in BASIC, you must use the following command.

```
DISPLAY"[DRIVE NO]:SIR"
```

CHAR\$() is used instead of CHR\$().

However (another one!), not all the differences are so annoying. For instance, when you DIM a string array you must set the length of the strings.

DIM A\$(5,10) gives you a one-dimensional array with five positions each with 10 characters. This means you can allocate the space used by your arrays more efficiently.

FLOW will print a line of the program on the screen *before* it is executed, making it easy to trace bugs. Of course NOFLOW

turns off the FLOW command.

One of the neatest things about Micropolis BASIC is its control of hard-copy output. There are 13 pages in the manual with examples, sample programs and sample printout, including such tricks as spooling a print file to disk and how to print it out later. With this you can process several print files, then stack them so they are printed out one after the other.

Next month I will go into a little more detail on how to use the data files that you can create on a disk with the Micropolis basic.

Saving With EDOS

I would like to mention EDOS, a program put out by System Software for the Micropolis drives. It a package which lets you load or save Sorcerer BASIC programs to or from the Micropolis disks. It works with almost all BASIC programs. Those programs with machine language sub-routines may have to be modified before you can successfully save them using EDOS.

As well as giving you the ability to save to disks, EDOS has other winning features. These are two graphics levels, low resolution (126 by 59 pixels) and high resolution (511 by 239 pixels). Both are used by a simple SET X Y command (HSET for high resolution) to turn on any

one pixel. You also have cursor control with the command CURSOR X Y, which moves the cursor to any position on the screen.

Naturally there is a routine to echo output to a printer. You can recover from a re-set or a new with the command OLD. There is even a BEEP command which lets you send a sound of set frequency tone and length to the parallel port.

The editor which comes with EDOS is worth a mention. It is a full screen editor, enabling you to list a program and then move the cursor around the screen to correct any errors.

The special commands of EDOS can all be accessed from a Sorcerer BASIC program, using PRINT CHR\$(4)A:EDOS COMMAND". At under \$50, EDOS is good value for anyone running Micropolis disks on the Sorcerer system.

Due to this issue's deadline, this column must go to the printers before the previous edition has gone on sale, so there will be no prizes this month in the Great Pun competition. But don't let this bug you, there is still time to printout your puns. Then you too can have a byte at the prizes, so peek into your old files.

See you next month, when we will give away a membership in the Mi Computer Club, and look at some of the Sorcerer Arcade games. □



SHORT CIRCUIT

SOME of the latest games for Apple are really spectacular. I would like to review a few for you:

In Apple Panic you are confronted with a series of ladders and creepy crawlies. Your mission, if you decide to accept it, is to climb the ladders and dig holes for the crawlies (called 'little apples') to fall into. Once they are in the hole you have to race back and knock them through the hole, by beating them on the head.

You have to be quick or they will start to climb out and eat you! Can you imagine the humiliation to you and your family when the Daily Bugle's front page screams: 'APPLE EATS MAN' (sub-headed 'A Man A Day Keeps The Gardener At Bay')?

At the same time, you have to also take great chances, as the sooner you rid the screen of the crawlies the greater the number of bonus points you receive. But if you think this is the end you are in for a shock. After you have mastered the first onslaught, you will find the 'apples' increase in numbers and so on until suddenly they decrease and a butterfly appears.

At this point much skill and dexterity is required. The butterflies are only destroyed by digging two holes directly underneath each other. Naturally, for a successful kill you are awarded more points.

Finally, just as you think you are a master you find there is the Dreaded Mask Of Death, which requires a three-hole kill.

One point to note, and this is not documented, is the need to watch your energy level. If you keep digging and running around you will slow down and finally stop, leaving yourself open to the monsters.

Top score for me was 55,000. The best Aussie score I've heard of is 84,000. Top, top-score is by the mother of Gary Carlton (of Broderbund Software), at around 120,000.

Genetic Drift

A new game from Broderbund is Genetic Drift. You are in charge of a central base, surrounded by nasties in the form of four rows of four, firing at you. These are called unfriendly life forms.

After you fire at the enemy and score hits, they mutate into television sets and send you loving kisses! However, they occasionally revert to sending you an upside down kiss which will, if it reaches your base, cause the televisions to return to

their pre-loving war-like state. Haight Ashbury Horrors!

Why the television set? According to Broderbund, extensive research in

California on teenagers found the species that man will most need by his side is the television set (obviously uneducated morons; anyone with brains would realise

Games Software Report Card

Program:	Apple Panic			
Made By:	Broderbund			
Available for:	Apple II			
Ratings:	excellent	good	okay	well, maybe
Ease of Use		✓		
Speed	✓			
Entertainment value	✓			
Educational value			✓	
Documentation			✓	
Value-for-money		✓		
Holds interest for	Hours			
Price:	\$31.50			
Review copy from:	Own library, available from most apple dealers			

Games Software Report Card

Program:	Cartels and Cutthroats			
Made By:	Strategic Stimulations			
Available for:	Apple II			
Ratings:	excellent	good	okay	well, maybe
Ease of Use		✓		
Speed			✓	
Entertainment value		✓		
Educational value			✓	
Documentation	✓			
Value-for-money	✓			
Holds interest for	For hours at a time but, can last for days			
Price:	\$41.50			
Review copy from:	Own library			

Apples are more man's friend than the television set).

After the sides are turned into television sets, you get a short break before starting

the next level.

Raster Blaster

The pinball game Raster Blaster, by Bill

Budge, features superb action graphics and sound. On the screen is a display of a pinball machine called a Billy, with no apologies to the well-known manufacturer Bally.

This is the new generation graphics game, and the speed and response are a credit to the programming skill of Bill Budge.

Raster Blaster is a game which is addictive to all, with some very interesting features, including up to four players and two levels of difficulty. The ball responds as if it was affected by gravitational pull.

The program is in colour, although it reproduces favourably on a black and white/green screen. There are features like the hooks, which when activated hold your pinball until all three hooks contain balls, then they release all the balls. You must then try to keep them all in play to maximise your score.

There is a spinner, which produces a very effective sound and a very good score. Raster Blaster is a must for all pinball freaks. Fun for all the family.

Games Software Report Card

Program:	Raster Blaster			
Made By:	Budge Co			
Available for:	Apple II			
Ratings:	excellent	good	okay	well, maybe
Ease of Use	✓			
Speed	✓			
Entertainment value		✓		
Educational value				✓
Documentation			✓	
Value-for-money		✓		
Holds interest for	Variable but, minimum for a few hours at a time			
Price:	\$31.50			
Review copy from:	City Personal Computers			

Games Software Report Card

Program:	Genetic Drift			
Made By:	Broderbund			
Available for:	Apple II			
Ratings:	excellent	good	okay	well, maybe
Ease of Use		✓		
Speed		✓		
Entertainment value		✓		
Educational value				✓
Documentation				✓
Value-for-money		✓		
Holds interest for	Few hours if your keyboard stands up to the frustration			
Price:	\$31.50			
Review copy from:	City Personal Computers			

Cartels And Cut-throats

Cartels and Cut-throats is a game from the Strategic Simulations stable. As the name implies, it is a business simulation game for up to six players. Its realism makes it a very exciting and playable game.

Cartels has a solitaire mode, so you can play against the computer. In this mode you play against computer-managed companies well known in the world of high finance. Companies like 'Apple Addicts' and 'Micro Merchants' are formidable opponents until you start to master the economic forces.

There are a variety of scenarios, meaning that you are able to simulate many different economic situations. Some of these factors are: inflation, raw material costs, product type (luxury, necessity, or in between), economic outlook and, finally, chance. Each of these situations has various levels.

Apart from the variable scenarios, there are four different games. The first is the open play option in which all players can observe the progress of each other. The second is a closed play situation, the third a hard copy option for those with a printer. Finally, there's a beginners' game where the computer has its own version of Bruce Bond to help you maximise your return on



YOUR APPLE COMPUTER

investment. It is the return on investment which determines whether or not you are successful.

Cartels is the sort of game where you can quickly sort out your socialist friends from the heavy right-wingers! It definitely favours the pragmatic capitalist who tries to obtain maximum benefit from the public. However, those hawks (or Frasers) who try to override labour and believe in sitting out a strike are in for a rude shock. The labour employed by the game is a determined lot, and tends to back-up its demands.

You are limited in the amount of capital at your disposal, and this means that you must quickly find a successful operating formula, or else you will lose. It's a game of fun and educational both of the real world of high finance and your friends' econo-political leanings.

Finally, some other interesting games I've seen but have not played sufficiently to review at this stage:

David's Midnight Magic is an advanced version of Raster Blaster, which it would seem will start up a new fad among Apple owners. The copy I saw was not yet completed, although by the time Whelan and Co get this published it should be available.

Track Attack may never appear on the Apple, as Broderbund was negotiating with Atari for its release on the video coin game market. In this game you have to drive your car around to grab the gold off a train, then to deposit it in a safe place. However, there is a maniac loose in another car who has the habit of running into you. If that was all, you could live with it, but the same car has kleptomaniacal tendencies and will steal the gold you have stored!

If you survive this you reach the second stage, where you have to run along the train from the caboose to reach the engine. Why I don't know, as this part was forgotten on the version demonstrated to me by Gary Carlston from Broderbund. The third part puts you in charge of the train and you must find all the gold the Kleptomaniac car stole. Confused? You needn't be — it is fun, and has some great graphics.

Last, some more interesting news on the software scene. At present it would appear there is almost a game a day becoming available for the Apple. I hope to be able to review as many as I can for each issue. □

your computer club news

APPLE Users Group (Sydney) is the new name for the NSW Apple Users Group, and the new contact is secretary Colin Rutherford, on (02) 520 0926. Postal address is: PO Box 505, Bankstown 2200.

The AUG meets at the Sydney Grammar School Science Auditorium on the second Monday of every month at 6.30 pm. The group maintains an expanding library on disk and publishes a monthly newsletter called Applications.

* * *

AUSTRALIAN CAPITAL TERRITORY

Australian ZX80 Users' Group (AZUG); David Brudenall, 19 Godfrey St, Campbell, ACT 2601.

MICSIG; Registrar, PO Box 446, Canberra 2601

OMEGA (Ohio Scientific Microcomputer Enthusiasts Group Australia); Geoff Cohen, 72 Spofforth St, Holt, ACT 2165.

Sorcerer Computer Users of Australia (ACT Branch); Mr G.T. Dick, 31 Creswell St, Campbell, ACT 2601.

NEW SOUTH WALES

Apple Users Group (Sydney); PO Box 505, Bankstown 2200. Phone Colin Rutherford, (02) 520 0926.

Australasian ZX 80 Users Newsletter; 87 Murphys Avenue, Keiraville, NSW 2500

Commodore Users Group; John Guidice, GPO Box 4721, Sydney 2001.

Compucolor Users Group; Andrew MacIntosh, 91 Regent St, Chippendale, Sydney 2008.

80-AT; The Australian 8080-Z80 Users Group; PO Box 165, Lakemba 2195.

Macarthur Computer Users Association; R.G. Friend, C/- 109 Campbellfield Ave, Campbelltown, 2560. Phone (046) 25 2752 (A.H.) or (046) 76 0541 extn 325 (Work).

MEGS; (Microcomputer Enthusiasts Group); John Whitlock, PO Box 3, St. Leonards 2065.

Newcastle Microcomputer Club; Gordon Johnson, Electron Microscope Unit, University of Newcastle. Phone (049) 68 5045 (Work).

NSW 6800 User Group; 27 Georgina Avenue, Keiraville, NSW 2500.

Sorcerers Users Group; PO Box E162, St. James 2001. Ian King, 15 Forest Avenue, Wahroonga 2076. Phone (02) 48 6072.

Ti-99/4 Home Computer Users' Group of Sydney; S. Andersen, PO Box 101, Kings Cross, 2011. Phone (02) 358 6662.

NORTHERN TERRITORY

The MicroComputer Association of the Northern Territory; Andy Smith, Darwin Community College, Casuarina, NT.

Northern Territory 80 Computer User Group; R.T. O'Brien, 433 McMillans Rd, Jingili, Darwin, NT 5792.

QUEENSLAND

Brisbane Youth Computer Group; A. Harrison, PO Box 396, Sunnybank 4109.

Commodore Computer Users Group of Queensland; Mrs D.D. Dillon, PO Box 127, Stones Corner, 4120.

Iree Microcomputer Interest Group; N. Wilson, PO Box 811, Albion 4010.

Superboard Users Group, Ed Richardson, 146 York Street, Nundah, 4012.

SOUTH AUSTRALIA

Adelaide Micro User Group (TRS-80 and System 80 Users); R.G. Stevenson, 36 Sturt St, Adelaide 5000.

South Australian Apple Users Club; The secretary, SAAUC, c/- The Bookshelf, 169 Pirie Street, Adelaide, 5000.

South Australian Microprocessor Group Inc (SAMG); The Secretary, PO Box 113, Plympton, 5038. Phone (08) 278 7288.

TASMANIA

TAS-Micro; Peter Deckert, Unit 1/456 West Tamar Rd, Riverside, Launceston, 7250.

Tasmanian OSI Users Group; David Tasker, 111 Bass Highway, Westbury, 7303

VICTORIA

Apple Users Society of Melbourne; G. Halprin, Phone (03) 859 5835.

BUG 80; Burwood Users Group, PO Box 46, Blackburn South 3130.

Compucolor Users Group; L. Ferguson, 12 Morphett Avenue, Ascot, Melbourne 3342.

Geelong Computer Club; Peter McKeon, PO Box 93, Geelong 3220.

KAOS (Ohio Scientific); David Anear, 49 Mil-lewa Crescent, Dallas, 3047.

National ZX80 Users Club; 24 Peel St. Col-lingwood, 3066

Northern and Western Suburbs Computer Users' Group; contact CP/M Data Systems, 284 Union Rd, Moonee Ponds, 3039. Phone John King (Secretary) (03) 338 9304

SMUG; SCORD M100 users, Robin Miller, 60 Winmalee Drive, Glen Waverley 3150.

Sorcerer Computer Users (Australia); Sec-retary, PO Box 144, Doncaster 3108.

WESTERN AUSTRALIA

Sorcerer Computer Users of Australia; The Secretary, 90 King George St, South Perth 6151. Phone (09) 367 6351

CU WEST (WA Compucolour/Intecolor User Group); John Newman, 8 Hillcrest Drive, Darlington, 6070.

NEW ZEALAND

Wellington Microcomputer Society Inc; Lindsay Williams, 2 Pope Street, Plimmerton, New Zealand.

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Sorcerer 32K \$1200, Expansion Unit \$400, DG640 VDU \$80, Godbout XX 32K Static RAM \$350. Ph: Terry (02) 682 4649. ah.

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your computer glossary

Absolute: Located at a fixed address in memory.

Access: To read or write from a location in memory, or a file, or disk.

Accumulator: The major register of a CPU, in which arithmetic and logical functions are performed. Some computers have several registers which can function as accumulators; in others some registers can perform a subset of the full set of operations.

Address: A memory location which can contain data or an instruction.

Algol: Algorithmic Language, an early computer programming language for mathematical applications. Widely used in Europe, embodied early structured programming concepts and was a precursor of Pascal.

Algorithm: A set of instructions which define a method of obtaining some result (usually mathematical). A cooking recipe is an algorithm, as is a knitting pattern.

Alphanumeric: Composed of either letters or numbers or both.

Analogue (Analog): Representation of a value by a voltage or some other measurable datum, rather than a binary or other representation based on counting.

Apple: The Apple 11 computer is a computer based on the 6502 microprocessor with an integrated keyboard. Noted for its colour graphics capabilities, which make it popular with schools.

Application: What you do with your computer.

Array: A set of values under a common variable name, which are accessed through a subscript. For example A[1] is the first item in array A, A[2] is the second, etc. A[N] is the Nth item.

ASM: Assembler. also a suffix added to assembly language file names to distinguish them from other files with the same name.

Assembler: A program which converts assembly language into its corresponding machine (or object) code, which can be executed by the computer.

Assembly Language: A language in which each machine code instruction is represented by a short mnemonic which is much more comprehensible to the programmer. For example, the 8080 machine code

[10010110]

is binary, is

[SUB L]

(subtract L from accumulator) in assembly language. Each line of assembly language becomes one machine instruction.

Assign: To make one thing equal to another, e.g.: [A = B] assigns the value of B to A.

Atom: An indivisible component of a data structure.

Attribute: A property possessed by some object, such as a file. Often attributes take the form of restrictions, such as a file being read-only.

Backup: An extra copy of a disk, tape or file taken as a precaution against damage of the original.

Backus Normal form: A special language (a metalanguage) used to describe precisely the grammatical rules of another language.

Base: The lowest number inexpressible in a given number system.

BASIC: Beginners All-purpose Symbolic Instruction Code. Invented in 1970 at Dartmouth College by Kemeny and Kurtz as a teaching language, it has since been enhanced in its more exotic forms into one of the most sophisticated yet easy-to-use languages available on personal computers. Its major rival is Pascal, which has the added virtue of stressing structured program design.

BDOS: Basic Disk Operating System. The major functional component of the CP/M DOS.

Binary: The system of counting in 1s and 0s used by all digital computers.

Binary Search: A method of searching for an entry in a table by successively halving the table until all that's left is the desired entry.

Binary Tree: A form of data structure in which entries are tagged on at the end of the appropriate branches.

BIOS: Basic Input/Output System. The part of the CP/M operating system which is different for each machine and provides any special I/O routines for disks, terminal, printer, etc.

Bit: Binary Digit. Either 1 or 0.

Boot: To load the operating system into the computer from a disk or tape, either initially or subsequently after running a program.

Bootstrap: To use one short program to load a longer loader program which then loads the operating system.

Branch Instruction: A program instruction which causes the computer to jump to another instruction, usually fairly close by.

Buffer: An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

Bug: an error in a program. Makes programmers itch.

Bus: A set of wires over which, data, addresses, or control signals are transferred between the central processor and memory or I/O devices.

Byte: A computer word eight bits wide. A byte in memory can hold a character or a binary number between zero and 255 (or — 128 and 127), or a computer instruction.

C: A programming language, developed at Bell Labs, which is particularly convenient for writing system utility programs.

Case Statement: An instruction found in some high level languages which allows control to pass to one of several subroutines depending on the value of a variable. For example, the BASIC statement

ON X GOSUB 100, 200, 300

will jump to line 100 if X = 1, 200 if X = 2, 300 if X = 3.

Call: A jump to a subroutine which leaves the return address on the microprocessor stack, so that when the subroutine is finished executing, control returns to where it left off.

CBASIC: A commercial version of the BASIC language, running under the CP/M operating system. Doesn't use line numbers on every line, and is compiled, rather than interpreted like Microsoft BASIC.

CCP: Console Command Processor. The part of the CP/M operating system that reads a command line and sorts out what it means.

Chain: To automatically run one program after another.

Character: A letter or number, or in some circumstances, a control code such as "carriage return".

Checksum: A running total of the characters in a file, recorded or transmitted with the file so that errors can be detected.

Code:

Absolute: Machine instructions which are intended to be loaded and executed in a particular area of memory.

Object: Machine instructions, as distinct from the source code from which it was generated.

Reentrant: Code which can be used by several users at once, keeping separate variables for each.

Relocatable: Code which can be loaded and run anywhere in the computer's memory.

Source code: A program written in assembler, or a high level language such as BASIC, which must then be assembled or compiled to produce the object code which can actually be executed.

Cold Boot: To start up a system from scratch, loading the operating system from disk or tape.

Cold Start: See Cold Boot.

COM file: In CP/M parlance a command file, that is, a machine code program that can actually be run.

Command: An instruction from the console for the system to do something.

Comment: A note added into a program to help the reader (or programmer) to understand its operation. Does not affect the program's execution in any way.

Compiler: A program which accepts as input a source file written in a high level language, and produces as output an object file containing the machine instructions which are actually executed.

Computer: Are you serious?

Concatenate: To join two strings together, one after the other.

Conditional: A test; for example, is X greater than Y: IF X is greater than Y
THEN GOSUB 500 (BASIC)

or, if the carry flag is set, jump to location NEXDIG:

JC NEXDIG (Assembler)

Conditionals are one of the most powerful features of any computer language.

Console: The keyboard and screen from which the operator controls the computer.

Control characters: Codes which perform functions like acknowledging correct receipt of a message or requesting retransmission of an erroneous message. Control characters are defined as part of the ASCII and similar codes.

Copy: To duplicate, usually for backup safety.

CP/M: A disk operating system for 8080 and Z80 based microcomputers. Allows the user to store information and programs in named files, as well as managing disk storage and input/output functions. Other disk operating systems include TRSDOS (on TRS-80) and DOS 3.3 (for Apple).

CRT: Cathode Ray Tube. Usually refers to the screen of a video terminal or the terminal itself.

Data: Information to be processed by, or output from, a program.

DDT: Dynamic Debug Tool. A program that assists the user to find errors in machine code programs.

Debug: To locate and fix errors.

Decimal: Based on ten.

Delete: To erase.

Device: A piece of equipment such as a printer or tape drive which the computer uses.

Directory: A list of the programs on a disk (or occasionally tape) together with necessary information, such as length and location.

Disc: A flat, circular magnetic surface on which the computer can store and retrieve data and programs. Is fast compared with tape, particularly when access is not one item after another.

Disk drive: The mechanical assembly which rotates the disk and positions the read/write head.

Disk Operating System: A program which operates one or more disk drives automatically and manages the system.

Display: The computer's output device at the console, usually a TV-like display of letters and numbers; sometimes the computer can draw on the display.

Double Density: A method of recording twice as much information on a floppy disk.

Dump: To list out the contents of memory or a disk.

Echo: When the computer inputs a character from the keyboard, it then sends it back to the display so that you can see it was received correctly.

ED: An editor program; part of CP/M.

Editor: A program which lets you alter and correct source files and other documents.

Erase: See delete.

Error Message: Tells you something went

wrong, and sometimes what.

Execute: To run a program; to follow its instructions.

FIFO: First in, first out.

File: A continuous collection of characters (or bytes) saved on a disk or tape for later reloading.

Fixed Point: Counting in integers only. Usually limited to small values, and restricted in accuracy, giving rise to ridiculous answers such as $9/5 = 1$.

Flag: A variable, sometimes a single bit, which can have only two values, used to indicate some condition.

Floating point: The kind of arithmetic used in scientific calculators.

Floppy disk: A disk, made of thin flexible mylar, and enclosed in a card jacket, which can be used for magnetic storage. There are two varieties; eight inch and 5¼ inch. These can typically store somewhere between 140,000 and 3 million bytes (characters).

Focal: Formula Calculator. A simple language, rather like a small BASIC, found on some mini and microcomputers.

FORTRAN: Formula Translation. One of the first computer languages, and beginning to show it.

Function: A sub-program that processes variables in some well-defined way.

Garbage Collection: The process of going through memory or disk space, reclaiming all the unused space.

Global: A variable which is known to all the parts of a program. See local.

Grammar: The formal rules of a language.

Hard Disk: A disk made of hard material, larger, faster and more fragile than a floppy disk, and capable of storing 70 million bytes or more.

Hard Copy: Printout.

Hardware: The bits of a computer you can kick, as opposed to the programs you can only swear at.

Hashing: A method of reducing the size of a table which otherwise would have mostly empty entries.

Hexadecimal: The method of counting to the base sixteen. Or the method of splitting binary digits into groups of four, which is the same thing. In hex, you count: 0 1 2 3 4 5 6 7 8 9 A B C D E F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F 20 21 22 . . .

Identifier: A label, or the name of a variable.

Iff: If and only if.

Index: A variable which usually points to an entry in a table or list.

Index Register: A processor register which is used to access tables and lists in memory.

Indirect Addressing: Referring to a variable which actually contains the address of another variable.

Input: To get data into the computer.

Instruction: A step the computer can perform.

Integer: A whole number.

Intermediate Code: A special kind of object code which cannot be run directly on the computer, but must be interpreted.

Interpreter: A program which examines source code a line at a time, decides what it means, and then does it. Compare with compiler.

Interrupt: To electronically drag the computer away from what it is doing in order to respond to some time-critical situation.

I/O: Input/Output.

Jump Instruction: Normally, control proceeds from one instruction to the next, one after the other. A jump instruction passes control, not to the following instruction, but to some other. Jumps can be conditional.

Kilo-: Prefix meaning one thousand.

Kilobyte: 1024 bytes (Kbyte).

Kilobaud: 1000 baud (kbaud).

Label: A word which identifies the destination of a call or jump instruction, or simply identifies some location in memory.

Language: The set of instructions, and rules for stringing them together, which you use to instruct the computer what to do.

Library: A set of programs, or sub-programs.

Line Number: A number at the beginning of a line, which identifies it in a similar way to a label.

Line Printer: A high-speed printer for computer output.

Link: Part of a data item in a list, which tells the computer the location of the next data item.

LISP: A list processing language, much favoured by the artificial intelligence community.

List: A sequence of consecutive data items.

Load: To transfer some data or program into the computer memory.

Locate: To "fix" a relocatable code so that it will only run if loaded in a particular location.

Logical Device: A device as the computer "sees" it: what the computer regards as the "list device" may be one of several "physical devices", such as a line printer or teletype.

Loop: To repeatedly execute a sequence of instructions; part of a computer program that is so executed.

Machine Language: The binary codes the machine actually executes.

Macro: A user-defined sequence of instructions which can be inserted anywhere in a program.

Macroassembler: An assembler which can utilise macros.

MBASIC: Microsoft BASIC; the BASIC used in the TRS-80, PET, Apple 11 and so on.

Memory: Where the computer stores data and programs internally for fast access.

Menu: A display which offers the operator a choice of several alternatives.

Microcomputer: A small computer based on a microprocessor.

Microprocessor: The central processing unit of a computer, built into a single silicon chip.

Mini-diskette: A 5¼ inch floppy disk.

MP/M: A multi-user version of CP/M.

NAD: A name and address file maintenance program.

Numerical analysis: The art and science of number crunching.

Object Code: Machine code.

Object File: A file containing object code.

Object Module: An object file containing part of a program, ready to be linked to others.

Octal: the system of counting to base eight, or grouping bits in threes.

Offset: To load an object file somewhere it will not run, in order to edit or modify it.

Open: To give the operating system the characteristics of a file so that it can subsequently read or write it.

Operand: The number an operator (+, -, etc) operates on.

all work. See Disk Operating System.

Operator: An arithmetic function or some other function which alters variables.

Optimization: Making a program work better (or faster, or using less memory).

Output: What the systems produces.

Packed Data: Data which shares the same address, and has to be unpacked before use.

Page: A length of memory, typically 256 bytes.

Parameter: A constant which sometimes has to be varied.

Parity: An extra bit on the end of a character or byte for error detection.

Pascal: A modern structured language which may eventually rival BASIC in popularity.

Password: A secret word the system may demand of you before allowing you access to certain (or all) programs or data.

Patch: A temporary (ha,ha) fix on a bug.

Peripheral: A piece of equipment the computer uses, like a printer, disk drive, or modem.

Peripheral Driver: A program which outputs data to a peripheral and controls it.

Physical Device: See Logical Device.

PIP: Peripheral Interchange Program. A CP/M utility for copying files between devices.

PL.1: Programming Language /1. A good general purpose commercial language.

Pointer: A variable used for indirect addressing.

Polish Notation: A method of separating operators and operands; e.g. + 5 4 is Polish Notation for 4 + 5.

Poll: To ask a peripheral if it requires service.

Postfix Notation: Also known as Reverse Polish Notation, this is similar to Polish; 4 5 means 4 + 5.

Preprocessor: A program which does part of a job to make life easier for the program which follows; e.g. a macro processor before an assembler.

Printer: Gets computer output down onto paper.

Priority: The resolution of which interrupt is serviced first if two should arrive at the same time.

Process: A program.

Program: A sequence of instructions which can be understood, and ultimately followed, by a computer.

Prompt: A message asking the operator to supply information.

Queue: A list in which entries are made at one end, and removed from the other.

R/O: Read Only; cannot be overwritten.

RAM: Random Access Memory.

Random Access Memory: The computer's internal memory which is used to hold running programs and data. The computer can both write and read RAM.

Read Only Memory: Memory used to store programs, which can not be erased or overwritten.

Reader: Paper tape input device.

Read/Write Head: The small coil which reads and writes on the surface of a disk.

Reconfigure: To reorganise the I/O or other aspects of a system.

Record: A set of related data items. For example, an employee's name, address, payroll number and pay rate would form a record.

Recursion: The ability of functions in some languages to call themselves.

Redundant: Not needed or taken for granted.

Reentrant Code: Code which can be used by several programs simultaneously, keeping separate data for each.

Register: A location in the processor capable of performing logical or arithmetic functions on the contents.

Relocatable: Capable of being moved in memory.

Relocatable Object Module: Part of a larger program consisting of many such modules, all linked together and located.

Resident: Permanently in the system.

Reverse Polish Notation: See Postfix.

RPN: See Reverse Polish Notation.

Run: To execute a program.

Save: To store a program on disk or cassette (particularly BASIC).

Schedule: To decide at what stage a process should run (of an operating system).

Screen: See CRT.

Sector: A section of data on a disk.

Simulation: Making one system behave like another.

Software: Programs.

Source Code: The original text form of a program.

Source File: A file of source code.

Source Language: The language the source code is written in, e.g. BASIC, Assembler, C.

Sort: To arrange items of data in order.

Spool: To output a file to a peripheral, usually either a printer or tape.

Stack: A list in which both entries and removals are made at the same end. A microprocessor usually has a hardware stack which is used to save subroutine return addresses, temporary storage of data, and to pass variables between subroutines.

String: A sequence of characters.

Submit: To put the system under control of a file of system commands.

Subroutine: Part of a program which can be accessed from several points within the program.

Symbol: The name of a variable or a location in memory.

Symbol Table: A table constructed by an assembler or compiler to give the addresses of all variables and labels in a program.

Symbolic Name: A label.

System: A collection of hardware and software, possessed of the property that the whole is greater than the sum of the parts.

System disk: A disk carrying the operating system.

Teletype: An electromechanical printer/-keyboard.

Timeshare: Running several programs on a system simultaneously.

Track: The area under the read/write head during one rotation of a disk.

Transfer: To move data.

Transient: A program that is only in memory for a short time before being overwritten. Often, the only program that is not a transient is the operating system.

Tree: A list in which each data item may refer to several others.

TTY: See Teletype.

Unix: A multi-user, multi-tasking, multi-programming operating system, expected to appear on microcomputers before long.

User: One of the people connected to the computer.

Utility: A program of use to most users.

Variable: Named quantity that can take or different values.

Verify: To check that data written on a disk or tape can be read again correctly.

Warm boot: To reload the operating system a second or subsequent time.

Word: The amount of data fetched from one memory location. Typically one byte, but can be two on recent processors.

Word Processor: A system for manipulating, editing, printing and formatting texts files.

WordStar: A proprietary word processing program.

Write Protect: To remove the cover from the notch in a floppy disk so that it cannot be written on.

Zilog: Manufacturer of the Z-80 and Z800C microprocessors.

Z80: A popular 8-bit microprocessor.

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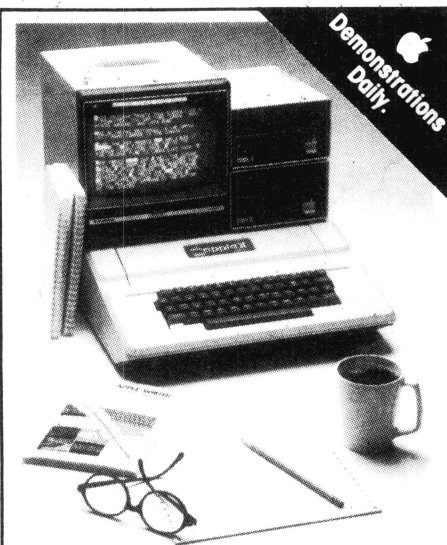
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advertisers index

Action Computer Services	44
AED	32
Applied Technology	Centre liftout
Bell and Howell	40
B.S. Microcomp	10
Calculator Supermarket	70
CISA	51
City Personal Computers	16,
Commodore	38
Compshop Australia	37
Computer Campus	69
Computer Galerie	98
Computer Imports	58
Computers Galore	75
Computer Solutions	49
Computerware	97
Computer Wave	25
CPU Applications	73, 83
CPU Computers	78
Customised Technology	9
CW Electronics	86
Cybernetic Research	24
deForest Software	20
Dick Smith Electronics	45, 47
Dubois and McNamara Software	27
Electro-Medical Engineering	11
Electronic Concepts	IBC
Gloster Software	41
Historic Australia	82
Hitachi	OB
Mervyn Beamish Graphics	97
Mi Computer Club	19, 86
Micro Computer House	75, 78
Micro Educational	14
Micro Vision	97
Moebius Computer Co	97
3M	77
QT Computer Systems	81
Sanyo	18
Seahorse Computer Services	83
SI Microcomputer	5
Sky Systems	97
Software Directory	97
Tandy	IFC
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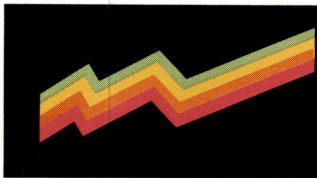
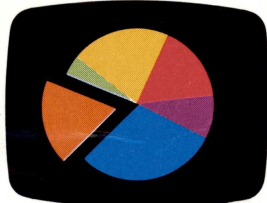
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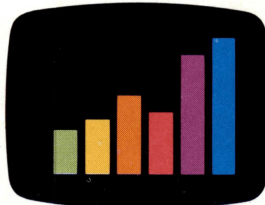
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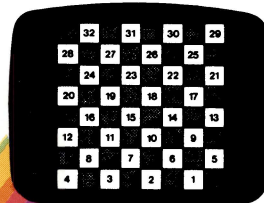
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